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INTELLIGIBLE COMMUNICATION: ITS NATURE AND CONDITIONS

I

LANGUAGE is the last and deepest problem of the philosophic mind. This is true whether we approach reality through life or through intellect and science. "All life", as Henry James has said, "goes back to the question of our speech, the medium through which we communicate". Life as it is merely lived is senseless. The meaning of life can neither be apprehended nor expressed except in language of some kind. It is no different when we approach reality through intellect and science. In a very real sense, "the limits of my language are the limits of my world". In the last analysis science itself is language well made. It is not surprising, therefore, that reflection upon language is one of the oldest and most constant preoccupations of the philosophic mind—that in all critical periods of human thought problems such as those of 'realism' and 'nominalism' have come to the fore. Nor is it surprising that it is in such a period, only greatly intensified, that we find ourselves today.

Communication thus becomes a basal problem of any philosophy. It was Plato who said in the *Theataetus* that knowledge is judgment plus discourse, which means that until discourse, communication, takes place, knowledge, at least in the full sense, does not exist. In more modern terms, knowledge and verifiability are inseparable and verification can scarcely be conceived without confirmation and therefore communication. Its basal character has, indeed, been recognized by all types of philosophic thought. For the idealist, as for instance, Royce in his later stages (*The Problem of Christianity*), communication becomes a basal category. So also for the realist, as for instance Spaulding in his book, *A World of*

Chance. For Pragmatism also the same is true, as witness the chapter on Communication in John Dewey's *Experience and Nature.*

The basal character of communication—intelligible communication—is, accordingly, indisputable. But what that communication is—its nature and its limits, as well as the conditions and presuppositions of such communication, are entirely different questions. Expressed in Kantian terms, we have the *quaestio facti* and the *quaestio juris.* The *quaestio facti* concerns the nature and range of communication; the *quaestio juris* concerns the question of what is involved in intelligible communication. How is intelligible communication *überhaupt* possible? In attempting to answer these questions we shall begin with the facts of communication, under the general heading, the nature of intelligible communication. We shall then proceed to the theories which attempt to explain or interpret it.

II

The nature of intelligible communication.—Communication takes place in other ways and through other media than that of language, but intelligible communication, I shall maintain, is possible only through language. If language first created the world of meanings, it is only through language as a medium that these meanings can be communicated. It is true that meaning of a sort may be communicated through non-linguistic symbols, as in both science and art, and of this we shall have more to say in a later context, but it is out of language that these symbols have developed, and to language they must ultimately return.

Communication by language is, to be sure, but one phase of a more general phenomenon. Naturalists make us familiar with marvels of communication between bees and ants, to say nothing of the higher vertebrates. Anthropologists find among primitives non-linguistic types of communication of extraordinary subtlety. But the fundamental characteristic of all such forms of communication is that they are bound up with the here and now. Karl Bühler has developed this point at considerable length, in contrasting animal communication with human, as extended by language. In the animal world, the individual does enter into com-

munication with others of his species through certain signs, but these signs always remain adherent to the thing signified, and this non-mobility of signs forever limits communication to the here and the now.[1]

This limitation of animal communication forever marks it off from human. Even the case which comes closest to human language, namely, animal cries, shows the same limitations. Let us suppose that such cries, as for instance the warning cry, contain something more than the emotional element, namely, potential indication and predication, as Mrs. de Laguna maintains; even these functions are never separable from the here and the now. The sign through which the communication is given, whether it be the bit of pollen which the bee gives to another member of the hive, as a means of orientation, or a cry of warning or mating, it is always a *cue to behavior,* and so far as we know, that is all that is communicated. The cooing of doves is a form of communication but, unless we are guility of the psychologist's fallacy, all that it communicates is just this behavioral meaning. We may describe this as behavioral communication in contrast with intelligible.

There is this behavioral communication between human beings also. Linguistic communication is embedded in it and presupposes it. The language of eyes, of touch and of pantomime, above all of gesture, developed by means of empathy in the broad sense, acts both as vital context in which language gets part of its meaning, and also as a means of enhancement of communication through language. But this form of human communication, in so far as it can be distinguished from linguistic, differs in no wise from animal communication. The gross but witty saying of Balzac, that "where we cannot understand each other with our heads, we can with our tails", expresses the point admirably. The erotic 'language' of eyes and touch is made up of signs which have meaning, but unless supplemented by language, only behavioral meaning. Here also their meaning is their function as cues to behavior. On this level human communication is also joined to the here and the now.

This then is what I shall describe as behavioral communication, whether found in animals or men. In contrast to this, intelligible

[1] Karl Bühler, *Die Crise der Psychologie,* 1927, pp. 51 ff. For an excellent discussion of this entire question; see also Ernst Cassirer, *Die Philosophie der Symbolischen Formen,* III, 385 ff.

communication is of a significantly different character. Here expression is not merely a cue to behavior but has as its correlate understanding (*Das Verstehen*). Strictly speaking, behavioral communication involves no understanding, despite Balzac's doubtful use of the term. What understanding involves we shall presently see. One thing we may say with a degree of certainty at this point. Only language, in some sense and some form, is understood. Intelligible communication is always a speech transaction and involves language in some sense. It is only in this way that communication goes beyond the here and the now.

Intelligible communication, of course, presupposes behavioral. Communication, like language which is its medium, is, as Vossler says, deeply embedded in nature, and it is for this reason that the illusion constantly arises that they are of the same piece. But it is, as he further says, an illusion that must be constantly dispelled. As, to use the words of Sapir, "Speech is a purely human, non-instinctive function",[2] so also intelligible discourse, through language, although embedded in a wider area of behavioral intercourse and communication, is clearly distinguishable from it. Let us then turn to a closer analysis of linguistic communication.

A. *The nature of intelligible communication. Definition.*—Only linguistic communication is, then, intelligible in the sense defined. Let us now see wherein linguistic communication consists. In developing my thesis I shall start with a definition of communication by Ogden and Richards.

"A communication or language transaction," we are told, "is a use of symbols in such a way that acts of reference occur in the hearer which are similar in all relevant respects to those which are symbolized by them in the speaker."[3] We may accept this definition as a starting point. As all meaning involves reference, so all communication of meaning involves a similarity of reference in speaker and hearer. The real problem, however, is contained in the apparently harmless qualifying clause, 'in all relevant respects'. This is the 'joker' in all such definitions.

It is immediately clear, of course, that there is no use of linguistic symbols in which the references are similar in all respects. The mere fact that, in addition to the primary reference or inten-

[2] *Language*, 7. [3] *The Meaning of Meaning*, 205.

tion of any word, there are secondary indirect references, variable in speaker and hearer, makes it clear that if intelligible communication, or understanding, involved similar reference in all respects, communication in any sense and in any degree would be impossible. On the other hand, it is equally clear that, for a genuine speech transaction to take place, the indirect references, or second intentions, must be similar in some degree. It is then the notion of relevance that is crucial. Let us proceed to a further analysis of this notion.

It is precisely the character of all verbal signs that they have plural references. In the case of metaphorical language—and in a sense all language is metaphorical—there is a double reference, to two domains or universes of discourse. If the poet says, "Gather ye rosebuds while ye may", in order that the meaning may be conveyed, it is necessary, not only that the primary reference be similar, but the secondary also. Again, if the speaker says, the sun rises and sets, and the hearer retorts, it does not rise and set, the two are, indeed, referring to the same thing or entity, but to different contexts or universes of discourse. They 'speak different languages' and unless the one language be 'translated' into the other, understanding or intelligible communication is impossible. We may say then that the similarity of reference which makes intelligible communication possible includes (a) similarity of referent, but also (b) similarity of context or of universe of discourse. Speaker and hearer cannot understand each other unless they recognize the same universe of discourse and mutually acknowledge the presuppositions which constitute or determine that universe.

We have here, I think, in principle that which distinguishes intelligible from behavioral communication. In the case of the latter there is merely similarity of reference to objects; in the case of the former the reference is never merely to entities, but always ultimately to similar universes of discourse. All linguistic meaning is referential, but it is also systemic.

B. *The problem of 'understanding'*.—Returning then to our initial definition, a communication or language transaction is, indeed, a use of signs or symbols in such a way that acts of reference occur in the hearer that are similar in all relevant respects to those that

are symbolized in the speaker, but when the notion of relevance is analyzed, it is found to include, not only similarity of references, but also similarity of suppositions which give these references their meaning. Every genuine language transaction involves mutual understanding or what we shall later designate as 'mutuality of mind'. Such understanding involves mutual acknowledgment, on the part of speaker and hearer, of what, for the moment, we shall vaguely describe as intentions, meanings and values, all of which terms will be later more clearly defined.

The general point we have been making may be further elucidated by an analysis of the notion of mutual understanding, which, as we have seen, differentiates intelligible from behavioral communication.

This entire notion of understanding (*Das Verstehen*)[4] has been the subject of careful examination in recent philosophical literature. For our present purposes we can note only certain points on which there seems to be general agreement and which alone are indispensable to our further argument. It is, in the first place strictly speaking, only linguistic expressions that are understood. What are the conditions of this understanding? On one condition of mutual understanding (or intelligible communication) all linguists seem to be agreed, namely, what Sapir calls "tacit recognition" of the universal. Only so, as he maintains, is communication in this sense possible. "For the simple experience lodges in the individual consciousness and is, strictly speaking, incommunicable. To be communicated, it must needs be referred to a class that is tacitly accepted by the community as an identity."[5]

This tacit recognition of the universal is then the primary and minimum condition of mutual understanding. The development of this notion of the universal as present in the "first precipitate of language", would in itself be rewarding, but the emphasis must here be put on the notion of *tacit recognition*. For tacit recognition or acknowledgment of something else is a further condition of understanding, namely, of what Husserl calls intentionality. Reference of the sign or symbol to an object is not the sole condition

[4] Ever since Dilthey's famous saying, "things we describe, persons we understand", the notion of understanding has played an important rôle in philosophy.

[5] *Language*, 11.

of meaning. The word marriage, for instance, has several meanings. In the mouth of the sociologist it means one thing, in that of the jurist another, and in that of the priest still another. It is the intentionality, or reference to the universe of discourse, which determines its meaning; and it is the tacit recognition or acknowledgment of this intentionality or reference which conditions mutual understanding or intelligible communication. For this intentionality, the scholastics had a special term, namely, supposition (*suppositio*). It is the supposition that determines the meaning, and the acknowledgment of the supposition which conditions communication of meaning. And this supposition, when closely examined, is found always to involve reference to values which are mutually, if tacitly acknowledged.

The miracle of language.—The 'miracle of language', as it is generally recognized by all who have given much study to it, is found precisely at this point. Language is *elliptical;* there is much more understood than is expressed. No account of communication can be given in terms of language considered as merely articulated sounds. It must include also that which is understood or presupposed. Communication, or conveyance of meaning, is not 'transfer' of ideas from one mind to another (that is merely a figure of speech); the miracle of it is that, through the sounds, which alone can be conveyed in this sense, that which is merely 'understood', in both speaker and hearer, can be mutually recognized and acknowledged. This mysterious fact any theory of communication must make intelligible.

In any case, communication is not the 'simple and prosaic' thing sometimes supposed; or better, it is simple only to those who do not realize what it includes. A language transaction is not simply a more complicated form of behavioral communication. Even the behavioral communication of animals has its element of mystery. Communication, even when limited to the here and the now, even when largely emotive, is a phenomenon which, while it may be described, is not wholly easy to understand, as we shall presently see. But linguistic or intelligible communication raises additional problems, precisely those indicated by its elliptical character. It is these which we must have chiefly in mind when we examine theories of communication. To these we shall now turn.

III

A. *The conditions of intelligible communication. The behavioristic or naturalistic account.*—The nature of communication both in its non-linguistic and linguistic, its behavioral and intelligible forms, is now before us. We have also examined the nature of linguistic communication or intelligible discourse. We may now ask what are the conditions of such discourse.

We have seen what the notion of conditions here means. It is the *quaestio juris* as contrasted with the *quaestio facti*—the problem, namely, of how intelligible communication, as we have come to understand it, is possible. What assumptions must be made in order to make this communication, this understanding, possible?

There are, generally speaking, only two possible answers to this question, namely, the naturalistic or behavioristic theory and the idealistic or transcendental theory. The first is undoubtedly the simplest and, *prima facie* at least, the most plausible account of communication. Let us examine it first and see how far it goes in its task of making intelligible communication itself intelligible.

This naturalistic theory is explicitly stated by I. A. Richards in Chapter XII of his book, *Principles of Literary Criticism*, entitled "A Theory of Communication". It is desirable to start with his version, for he himself contrasts this theory with the 'transcendental' theory in such a way as to bring out clearly the issues involved.

In the first place, we are told, "artificial mysteries are made out of this very simple and prosaic matter of communication. Transcendental considerations are brought in where they are unnecessary. All that really occurs is that under certain conditions separate minds have closely similar experiences." He starts, then, with the naturalistic assumption of the natural isolation and severance of minds, their experiences at best being, under the most favorable circumstances, merely similar. Communication then takes place when "one mind so acts upon its environment that another mind is influenced and in the other mind an experience occurs which is like the experience in the first mind and is caused by part of that experience. This is all there is to the prosaic matter of communication."

Now communication may be prosaic enough—much of it doubtless is—but that it is as simple as all this we have already had occasion to doubt. One thing certainly is clear. It is *simply not true* that all that occurs in intelligible communication is that under certain circumstances separate minds have closely similar experiences. We have now only to examine the theory based upon this assumption to turn our doubts about its validity into certainties. This naturalistic or behavioristic theory is stated much more adequately by C. I. Lewis in his *Mind and the World Order*. We shall therefore use his statement as the basis for our examination.

"The only conditions of communication", he tells us—and under communication he includes the entire range of linguistic and non-linguistic, behavioral and intelligible—"are the fact that we are creatures fundamentally alike and that we are confronted by a common reality". Negatively stated, there is nothing else of which we may say absolutely that "unless this much were common in what is given us, we could not understand each other at all". As speech itself is "only that part of behavior which is most significant of meanings and most useful for communication", so linguistic communication is only that part of communication in general which is most significant and the conditions of that communication are nothing more than the conditions of any other form.

B. *The limits of the behavioristic theory.*—This simple answer is most natural and plausible. The law of parsimony would seem to counsel us to reduce the problem to its simplest terms and to seek only those conditions which are indispensable to the simplest form of communication. Nevertheless, whatever plausibility it has it gets, I think it can be shown, from the exploitation of an ambiguity in the notion of similarity in both of its aspects. Let us then examine this view, separating for the moment the two conditions, namely (a) similarity of organism ("creatures fundamentally alike") and (b) similarity of environment ("common reality").

The fact that the creatures concerned in communication are fundamentally alike does seem to explain behavioral communication without a remainder. The cooing of doves, or the mating cry, are forms of such communication, and unless we are guilty of the

psychologist's fallacy, all that they communicate are cues to behavior, and probably all that is required here is similarity of instinctive and emotive structure. But the situation is significantly different when we come to intelligible communication. In behavioral communication there is similarity of reference, but no sense of the "relevant respects" in which the similarity exists. It is this element of relevance—and the tacit or expressed recognition of this relevance, acknowledgment of the intentional element, of the universe of discourse and its pre-suppositions—that constitutes and conditions intelligible communication. This no mere external similarity of organism can explain. The likeness of the creatures communicating must go far beyond this conception.

We may conclude then that the notion of similarity of organism, of creatures fundamentally alike, is a wholly ambiguous notion. Taken in one of its possible meanings—its simplest—it cannot, by any stretch of the imagination, be made to explain any but the lowest levels of communication. Taken in a broader sense—so that it may be capable of application to higher levels of communication—it includes similarity of mental structure, a certain "mutuality of mind", to use a term also employed by Professor Lewis, an inclusion which, as we shall see, begs the entire question at issue. A similar ambiguity we shall find inherent in the second condition, namely, a "common reality", or similarity of environment.

Communication in all its forms involves similarity of reference. Even behavioral communication, as in animal cries, involves reference, in the sense at least of indefinite reference to a context or situation. It is obvious, therefore, that this reference would be impossible unless the communicating organisms had a common reality. Now similarity of environment, in the sense of similarity of conditions of physical existence, may conceivably be sufficient to account for this element of reference in animal communication. But the common reality necessary to account for the similarity of reference in linguistic communication goes far beyond the physical environment. Such communication is not confined to the here and the now—to the context of situation—but extends to universes of discourse far beyond the merely physical context.

Here again, then, we may say that the notion of a common

reality is thoroughly ambiguous. Taken in one sense, the simplest, it can explain only the simplest cases of similarity of reference, namely, the here and the now. Taken in a broader sense, so that it may be extended to include other forms of communication and reference, it assumes in the notion of common reality the very elements of community which it seeks to explain. Professor Lewis tacitly recognizes this fact in his admission that the reality is "largely constructed". This aspect of reality, however large it may be—in that it *is* constructed—implies not only mind, but an initial mutuality of mind—in other words, the very communication which it is designed to explain.

C. *Range of communication on the behavioristic theory.*—The basal issues involved in this question are so important as to warrant still further discussion. These issues are brought out clearly in a passage in which Professor Lewis puts his theory to the test of certain hypothetical cases. His thesis is that, on these simple assumptions, there would be the possibility of the indefinite extensibility of understanding and communication. Now it is just this thesis that I would challenge—not of course the 'miracle of communication'—but its possibility on Professor Lewis's assumptions.

He points out, first of all, that, as an actual fact, an initial community between like-minded individuals is capable of enormous expansion, and that the manner of that expansion is familiar. He supposes two men, speaking different languages, but having a few words in common, to be chained to the opposite walls of a dark cell, so that the possibility of establishing common meanings by pointing and naming would be at a minimum. "With good luck in the initial common concepts and with a high order of intelligence, they would eventually establish a very large range of common notions." He cites the actual case of Helen Keller, in which a normal range of understanding has been developed from an original coincidence of merely kinaesthetic and contact sensations. He then passes to the illustration I have specifically in mind. Suppose there should be creatures on Mars of a high order of mentality. They might psychologically be rather different from ourselves and have senses and experience largely incomparable with our own. Yet if we could establish some initial common understanding (say if we should signal them by light flashes, --, --, --, and they

should eventually respond with ----, ----, ----, then, in spite of our differences from them, "it would be hard to set a limit beyond which it could with certainty be said that our common understanding could not go". He speaks of the indefinite extensibility of conceptual understanding.

Now it is just this thesis of indefinite extensibility of understanding that I would challenge. Not, I repeat, the fact—that is indeed the very character of linguistic communication—but the *possibility* of the fact on Professor Lewis's premises. Assuming merely a similarity of organism that consists solely in coincidence of kinaesthetic and contact sensations, and similarity of environment or common reality that is no more than light flashes, no such extension of communication is conceivable. Much more must be assumed, and actually much more *is* assumed in Lewis's statement of the situation—namely, "an initial community of like-minded persons, creatures of a high order of mentality". In these comparatively innocent phrases is concealed all that I am contending for. For what do these phrases mean? I do not know what "like-minded individuals" means unless that they have like categories and acknowledge like values. I do not know what "a high order of mentality" means unless an order of mentality in which language, and the meanings it embodies, have already developed. In order that such an extension of conceptual understanding may be possible, it is not necessary, of course, that there should be languages of the same external form, but it is necessary, as Jespersen says, that there shall be community of "notions" lying back of the linguistic or grammatical categories. It is not necessary that they shall have the "same sense of values"—the tremendous historical differences show this—but it is necessary that there shall be, however limited, a "commonwealth of objective values", mutually acknowledged.

D. *Tacit assumptions of the behavioristic theory.*—The entire problem at issue here is clearly stated by Professor Lewis when he tells us (p. 96) that for our actual and most elaborate mutual understanding a simple foundation would be sufficient—"a relatively meagre mutuality of concepts, given human powers of discrimination, abstraction, and relation and our human social habits, would be all that is necessary". He is not arguing, he continues, "that it is from such a meagre basis of initial mutuality that the

community of understanding actually develops". He wishes only to point out the fact that, "given such a meagre mutuality, elaborate common understanding could develop, and that to argue straight from our common understanding to an equally extended coincidence of felt qualities or given experience is unnecessary and fallacious".

With the actual extent of this initial mutuality I am not greatly concerned, but rather with the fact that such mutuality is postulated and what its postulation involves. The relatively meagre mutuality assumed by Professor Lewis seems to me a rather generous allowance, and one out of which almost any type of communication can be developed. It is, I repeat, with the notion of initial mutuality of mind itself with which I am concerned. It includes, it seems to me obvious, much more than what was stated in the original premises. Not merely an external similarity of creatures—not merely a common external environment that acts causally upon the creatures in the same way. Mutuality of mind, if it means anything at all, means mutual acknowledgment of certain meanings and values, and it is only upon the basis of such acknowledgment that any real communication, as distinguished from merely apparent, is possible at all.

Professor Lewis's interest in the problem of communication is primarily an epistemological one. He recognizes that knowledge is public and involves communication. Part of the problem of knowledge is then always the question of what is necessary for communication. On this point he takes issue with both the sensationalist and the rationalist, with the realist and the idealist, as to what is necessary for intelligible communication. The former insists that our common world is given to us in a common sensory experience; the latter insists upon the assumption of "an ideal and complete agreement in an immutable set of categories". Theories of both types, he holds, are based on "nothing more or less than beautiful myth" (92). Elements of myth there may be in both these theories of community of mind, but the notion of community of mind itself is far from myth, for this notion in some form alone makes intelligible the element of communication necessary for knowledge. This is the essence of the transcendental theory to which we shall now turn.

IV

Conditions of intelligible communication. The transcendental theory.—Communication, I think we may now see from the foregoing, is scarcely the simple thing which the naturalistic theory envisages. It may be prosaic enough—much of it doubtless is—but that it is as described by Richards only a most naïve analysis could for a moment suppose. The mysteries made of this matter of communication are not at all artificial, but thoroughly genuine to any one who takes the trouble to analyse what is really involved in a speech transaction. The miracle of language, as we have come to understand it, lies precisely in the fact that it is elliptical—that so much more is understood than is expressed. It is precisely the range of this mutual understanding, of this *a priori* mutuality of mind, that necessitates some transcendental theory.

Let us then examine those theories which, according to Richards, bring in transcendental considerations where they are unnecessary. Our task will include three phases: (a) the reasons for bringing in such considerations, (b) a statement of the transcendental theory, and (c) evidence for the theory.

A. *The reasons for the transcendental theory.*—First of all, those who reject the naturalistic theory do so, according to Professor Richards, "because of some mystical, poetic conception of intermingling, penetration, of minds, or even that particular minds are an illusory appearance of an underlying unity of mind". They reject the simpler theory and accept the more involved, "not on grounds of evidence, but on grounds of desire, due to the influence of the contrary opinion on their attitudes towards their fellows". We shall consider first this account of the motives for rejecting the naturalistic theory and then proceed to develop the real grounds of those theories which find transcendental consideration necessary.

The rejection of the naturalistic theory, it must now be evident, is not based wholly on grounds of desire, although it is not entirely clear why the presence of this desire for real communication with our fellows, and oneness of a more internal kind, should not be considered at least part of the evidence. Nor is the rejection due to mystical and poetic conceptions of intermingling or penetration of minds, although the transcendental conception has often been expressed poetically and very beautifully, and there seems no good

reason why, in certain contexts, it should not be so expressed. Indeed the omnipresence of this notion in all the higher ranges of poetry seems to me to be part of the evidence for its truth. No: the real reasons for its rejection are of quite another order. It is precisely the facts of communication, their character and their range, which, when examined closely, make such a theory wholly unintelligible.

But these are negative reasons. They are indeed part of the evidence, but there are also positive reasons. It is admitted by Professor Richards that "if there were direct contact of mind with mind, if actual transference and participation did occur, we should of course be compelled to adopt the transcendental theory". "It does not occur", he holds, "and no arguments that assume it have the least weight". Now I am disposed to believe—and I think it can be shown—that just this "direct contact" and actual participation do occur (that is if the meaning of these terms is properly interpreted); but I do not think that it is this fact alone that compels us to adopt the transcendental theory. It is at best part of the evidence, and since it is felt to be compelling by many we shall consider it briefly.

It is immediately clear that both of these terms, direct contact and participation, are figurative expressions taken from the physical universe of discourse. There is, of course, no contact in the literal sense, and no mind becomes part of another mind in any spatial sense. Properly interpreted, the problem becomes this: is there any initial mutuality of mind, prior to and conditioning communication of meaning from mind to mind? In other words, is there any *real* communication, as distinguished from merely 'apparent' (that is, merely similarity of references in two wholly separate minds)? If so, is there any evidence for it?

When the question is formulated in this way, I think it will be seen to be in essence the same problem which we have in connection with "the knowledge of other minds". Is there any direct or immediate knowledge, or is what we call knowledge of other minds merely indirect or mediate knowledge by analogous inference or *Einfühlung* (empathy)? For real communication, in the sense in which we have defined it, presupposes this direct knowledge. The first type of theory holds that there is direct awareness or intuition

of other mind, and that this awareness is a function of a oneness or mutuality of mind that transcends and is presupposed by experience. The latter, starting from the assumption of the natural isolation of minds, and their merely external similarity, attempts to account for what knowledge of other minds there actually is by processes of analogical inference or imaginative projection.

This latter theory is practically abandoned in either form. As for the first form, the most significant reason is the fact that analogical inference, one of the weakest types of inference, is made the basis for one of the strongest of all certitudes. This certitude is itself not generated by analogical inference; rather is it true that our inference by analogy, as to the content of other minds, actually presupposes this initial certitude and an initial mutuality of mind.

This serious difficulty in the first form of the theory led to its abandonment and to the belief that the basis of this certainty must be sought in something deeper, namely, in the originality and immediacy of feeling. Yet on examination, it becomes clear that this theory (of *Einfühlung*) is really in scarcely better position. It is true that it enables us to understand better those forms of prelinguistic communication, before language and ideal construction, necessarily presupposed by the inference theory, have been developed. But this theory has the same fundamental weakness as the other; namely, that here again one of the strongest of certitudes is based upon nothing stronger than imaginative projection. A vicious circle is present in this form of the theory no less than in the first. It seeks to explain communication in terms which already presuppose its existence. It is one of the services of Scheler to have exposed the weakness of the *Einfühlung* theory no less than that of analogous inference.[6]

There are, then, reasons of fact for bringing in transcendental considerations. These are precisely the evidence for direct communication of mind with mind which, according to Richards, if it existed, would necessitate the transcendental theory. Let me state the situation in another way. There is real communication—not merely apparent, as on the theory of Richards and Lewis. In other

[6] Max Scheler, *Wesen und Formen der Sympathie*, Bonn 1923, 282 ff. See also on this point Ernst Cassirer, *Die Philosophie der Symbolischen Formen*, III, 101 ff.

words, it is not true that all there is to communication is the simple fact that separate minds have similar experiences. That would be no real communication at all, but merely apparent. Now the point I am here making is this. All attempts to explain knowledge of other minds actually presuppose, as we have seen, this *real* communication. In an interesting study of this problem by Karl Jaspers in his book entitled *Philosophie,* this point is argued with great force. He distinguishes between linguistic and what he calls existential or *"eigentliche Kommunikation"* and shows quite clearly that the former presupposes the latter. It is, he admits, always possible to deny real communication and to give it the status of illusion. It is also probable, as he further admits, that it is not possible to refute this denial logically. It may be maintained that man is after all ultimately himself and not another. Real sharing of meaning is impossible. The individual is a monad without windows. Such a denial cannot be refuted logically, for it starts with the metaphysical assumption of the severance of minds and therefore gets from its premises precisely what was included in them. But it can be refuted dialectically, for it can be shown that the very communication that is thus denied is assumed in the denial.[7]

The question of the nature and significance of evidence of this type will be considered presently. Here our only point has been this. If, it was said, there were direct contact of mind with mind —real or existential communication—then we should be compelled to adopt the transcendental theory. It does not, however, occur; therefore our arguments that assume it have not the least weight. We have shown that it does occur, and so we proceed to the consideration of the transcendental theory which, it is admitted, these facts make necessary.

B. *Formulation of the transcendental theory: The metaphysical speech community.*—We have seen the reasons, both negative and positive, which have given rise to the transcendental theory of the conditions of intelligible communication. Let us now proceed to a statement of it. The theory has indeed often been formulated in poetical and mystical terms. There is, for instance, a poem of Matthew Arnold's entitled *Isolation* in which the poet compares

[7] Karl Jaspers, *Philosophie,* Berlin 1932. An entire chapter in his second volume is devoted to the subject of *Kommunikation* and its relation to knowledge.

the souls of men to islands scattered in the main; at their invisible bases they are united into one vast continent, and in rare moments they become conscious of that deep-seated unity; but for the most part they are only sensible of the distance which divides them from one another, by reason of the "divine ordinance"

> Which sets between their shores to be
> The unplumbed, salt, estranging sea.

On the view here expressed, the isolation of minds is the surface phenomenon; the underlying unity is the more fundamental.

Poetical and mystical forms of statement are not to be dismissed lightly. Conceptions of intermingling and penetration, though figurative, are the only forms in which truth of this sort can be given concrete expression. If then we pass to more abstract forms it is because only in this form is the transcendental hypothesis or theory usable philosophically. The more abstract form substitutes for such notions the idea of an over-individual mind, of a transcendental self, or perhaps of a transcendental community of minds. The fundamental notion here is that of common experience —something shared by individual minds—which makes possible intelligible communication. With this notion we are already familiar through Professor Lewis's criticism of it. This assumption or postulate of a common experience, whether in the form of common sensory experience or of an ideal or complete agreement in an immutable set of categories, is, we are told, nothing more than a "beautiful myth".

Now the essence of the transcendental theory is that we are dealing, not with myth (although there may be mythical or figurative elements in our forms of statement) but rather with epistemological 'fact' and 'necessity'. Few transcendentalists—certainly not Kant himself—would be disposed to think of the notion of the transcendental Self as more than a symbol for this underlying unity. But the unity thus symbolized is itself not a myth. It is a necessary condition of that universality, that mutuality of mind, however small, without which knowledge and its communication are impossible. Whether for the unity thus symbolized we use the "myth" of an over-individual self or of an over-individual community, is, from the present point of view, a matter of relative

indifference. I do not much care in the present context whether one thinks of an all-embracing mind in which finite minds live and move and have their being, or of an over-individual society of minds. Important as these issues are in other contexts, they are not the significant thing here. What is significant is the *transcendental minimum* or the minimum of "transcendental considerations" nececessary for the understanding of intelligible communication. All the rest may well contain an element of figure or myth as, I am inclined to believe, it did for Kant—although even then it would be very significant myth.

It is interesting that Kant himself recognized, although dimly, the relation of his transcendentalism to the problem of communication. In a letter to Beck he is trying to make clear the ideas of the transcendental deduction of the categories. He writes: "We can not perceive connection as given, but we must ourselves make it; we must do the relating if we are to represent something to ourselves as related (even space and time themselves). *It is solely in respect to this connection that we are able to communicate with each other . . .*" (italics mine).[8] He adds humorously, "I may say as I am writing, that I do not adequately understand myself". It is not strange that Kant, like many another wrestler with new thoughts, did not wholly understand himself, nor that later philosophers should understand him better than he did himself. Kant was dimly aware that communication and communicability are part of the very notion of knowledge itself, and that the element of universality, which alone makes possible communication, involves the notion of mind or self that transcends both the object and the individual communicating subjects. He saw clearly that it was solely by virtue of the transcendental elements in knowledge that intelligible communication itself, when really understood, becomes possible. Surely that was a great thing to see, even if he saw it only dimly.

C. *Criticisms of the transcendental theory. (Empiricism).*—"Professed transcendentalists have as a whole", Professor Dewey

[8] Letter to Beck, July 1, 1794, in the Kant manuscripts in the Royal Library in Berlin. Kant never worked out a theory of communication in its relation to knowledge, but it is clear from his discussion of the notion of the *Critique of Judgment* (in connection with the aesthetic and its objectivity) that objectivity and communicability were closely related in his mind.

tells us, "been more aware of the problems of communication than professed empiricists". I think that after our examination of naturalistic and empirical attempts to "explain" intelligible communication, we may see that he is right. Nevertheless, it may help to make clear our position if we permit him to show us just where, in his opinion, these problems lie.

"Thinkers", he writes, "may start with the naïve assumption of minds connected with separate individuals. But developments soon show the inadequacy of such 'minds' to carry the burden of science and of objective institutions like the family and the state. The consequence was revealed to be *sceptically disintegrative*, malicious (italics mine). A transcendental, supra-empirical self, making human or finite selves the medium of manifestation, was the logical recourse. Such a conception is an inevitable conclusion when the value of liberation and utilization of individual capacity in science, art and industry is a demonstrated empirical fact; and when at the same time individuality, instead of being conceived as historic, temporally relative and instrumental, is conceived of as original, eternal, and absolute. When concrete reconstructions of natural and social objects are thought of as a single constitutive act, they inevitably become supernatural and transcendent. When the movement terminates, as in the later philosophy of Josiah Royce, with a community of selves, the circle has returned to the empirical fact with which it might properly have started out; but the intervening insertion of a transcendental self remains as a plague. It isolates the community of selves from natural existence and in order to get nature again in connection with mind, is compelled to reduce it to a system of volitions, feelings and thoughts."[9]

A transcendental supra-empirical unity of mind is, I think, clearly inevitable, as Professor Dewey admits, if we start with the assumption of separate selves. Mind so conceived is surely inadequate to carry the burden of human communication and all its works, both of science and of human institutions. But does Professor Dewey's substitute for such a unity of mind really solve the problem? Is it not rather, in fact, precisely when selves are conceived as merely historical, spatio-temporal, that the miracle of communication, as we have come to see it, becomes finally and wholly unintelligible? For if it is true, as Dewey argues, that,

[9] *Experience and Nature*, V, 168.

starting with the assumption of separate selves as original, eternal, and absolute, there is no real communication, but at best a mere similarity of reference, is it not even more obvious that, if we start with the purely historical and relative view of selves, real communication, that is, communication in any but a behavioral sense, is impossible? Such a conception is also inadequate to carry the burden of communication. This our examination of naturalistic theories has already abundantly shown. As a matter of fact, Professor Dewey actually starts with the assumption of *real* communication and does not try to explain it or make it intelligible. We are not surprised to find that, on the whole, he tends to make communication itself an ultimate category although he, of course, refuses to draw the transcendental and idealistic consequences involved.

It is precisely the drawing of these consequences that he criticises in Royce in the latter part of the passage. "With the notion of a community of selves in Royce's later philosophy, the circle has returned", we are told, "to the empirical fact with which it might have started". *But that is precisely what it has not done.* Empirical facts of communication there are, indeed—and it is upon such facts, of course, that theories of communication must be based—but the community of selves as implied in these facts is itself not an empirical fact, verifiable in terms of the empirical criterion. It is, as we have seen, a transcendental requirement of intelligible communication. It is not then to a sociological notion of a community of selves that the circle has returned, but to a transcendental or metaphysical conception of community. Whether this also is verifiable, in its own way, we shall presently ask, but it is above all necessary to see that this community of selves is metaphysical.

In his *Spirit of Language in Civilization* Karl Vossler makes use of the term metaphysical speech community. On his view—and it is the view here presented—it is impossible to understand speech or intelligible communication, in all its significance, without widening the notion of community and communication into a metaphysical conception. The linguist, as such, deals with what he calls empirical speech communities, some of them of very extensive range, but these empirical communities presuppose the metaphysical. The same requirement has been expressed by Husserl when

he tells us that the "prerequisite" of linguistic communication, when properly understood, is "a transcendental monadism, a transcendental sociological phenomenology having reference to a manifest multiplicity of conscious subjects, communicating with each other".

D. *The question of evidence.*—Whenever "transcendental considerations" are brought in, in any theory of knowledge, empirical and naturalistic thinkers always reply that for such there is no whit of evidence. Now I have already indicated why, to my mind, there is evidence for *real* communication in the sense of direct contact of mind with mind, or actual participation, if these terms are properly interpreted. But, as I also indicated, it is not this evidence alone, or indeed chiefly, that forces us to accept the transcendental theory. It is rather evidence of a more weighty character with which we are here concerned.

In order to recognize and weigh evidence we must know precisely what the theory is for which we are seeking evidence, and the kind of facts which would constitute evidence for the theory —in this case what the problems of intelligible communication really are. Of these problems the transcendentalists have had, as Dewey says, in the main a better understanding than the empiricists. They are, as we have seen, the problems set by intelligible communication, and it is these facts which when properly analyzed seem to require the hypothesis of a transcendental mutuality of mind.

Now it is quite clear, first of all, what evidence for such an hypothesis of theory can *not* be. The supra-empirical unity implied in intelligible communication *is* supra-empirical and, therefore, by definition, not verifiable as an empirical fact by a direct application of the "empirical criterion". All that is directly observable are merely the facts of similarity of organism and of environment, and these facts, as we have already shown, constitute merely apparent, not real communication, and are wholly inadequate to account for intelligible communication in both its nature and its range. Indeed, even in the naturalistic theory itself something more was *tacitly* postulated, namely, the very antecedent mutuality of mind which was verbally denied.

Evidence for such a supra-empirical unity of mind must ac-

cordingly be indirect. Since this unity itself is not an object of sensible experience, but rather the presupposition of the possibility of any experience and its communication, we may call this *evidence for presuppositions*. With this notion we come, of course, to what has been the basal issue between pure empiricists and transcendentalists, an issue upon which it is difficult to come to an understanding—the issue namely whether the possibility of experience and of its communication are themselves facts which require to be interpreted or explained. If they are, as the transcendentalist always holds, then the evidence here must be of special nature, the proof, as Lewis says, of a "peculiar kind". Let us examine this evidence.

The argument of the transcendentalist may be of a peculiar kind, but if so it is only because the facts upon which the argument is based are of a special order. Mind, conceived as wholly isolated separate selves, it finds, with Dewey, wholly inadequate to carry the burden of communication and all its works, both science and human institutions. But equally inadequate is mind when conceived in purely naturalistic terms of history and sociology. It is upon these considerations that the evidence rests. Such evidence is, to be sure, largely negative, but not wholly so. The force of the transcendental argument rests, in the last analysis, on certain positive considerations, namely, the actual character of intelligible communication as we have seen it to be, more especially of understanding which is involved in such communication. If the character of these facts is acknowledged—if real communication, as contrasted with merely apparent, is recognized—then the "transcendental considerations are necessitated for the understanding of these facts". This is evidence in any proper sense of the word.[10]

[10] Professor Lewis, *op. cit.*, 200 ff., discusses this "argument to presuppositions" as a peculiar kind of proof and finds it invalid. Into his criticism I can not go here, but it rests, I think, upon a misunderstanding of the nature of the argument. For the argument is not from *experiences* but from the *possibility of experience*. In the Kantian argument that is a "fact" to be explained. Similarly Morris R. Cohen (*Contemporary American Philosophy*, I, p. 227) writes: "Kant can not offer any cogent proof that there may not be some other set of assumptions which will also explain the facts of experience." Kant is not seeking to explain the *facts* of experience, but the *possibility of our experiencing these facts*, which is a wholly different matter. As H. J. Paton clearly sees (*Kant's Metaphysic of Experience*, II, 103-107), whether right or wrong, Kant's argument is not of the type assumed by his critics. The indirect proof from the possibility of experience is different from proof from the facts of experience.

This entire question of evidence seems to be greatly misunderstood. It is a well-understood principle that you cannot disprove a theory if you rule out *ab initio* the facts upon which the theory is based. This is, however, precisely what the naturalistic theory of communication does. It dismisses as irrelevant precisely those facts of communication upon which the transcendental theory is based. It assumes that the entire problem of communication is the scientific problem of the causal explanation of how communication develops. It forgets that this is no real explanation, for science itself presupposes the fact of communication, the very thing to be explained. Thus the naturalistic theory, starting with certain assumptions—namely, the natural isolation of minds, and the definition of communication as merely similarity of reference—rules out *ab initio* both the problem itself and the evidence which the transcendental theory finds most significant.

V

Communication and knowledge: The primacy of linguistic communication.—I began this study with the statement that language (and intelligible communication) is the last and deepest problem of the philosophic mind. That it is fundamental in philosophy and all philosophical discourse, the preceding discussions have, I think, amply demonstrated. The full significance of our conclusions will, however, be clearer if we develop briefly certain consequences or corollaries of the position here maintained. These we shall state briefly under the two heads: (a) Communication and Knowledge and (b) the Primacy of Linguistic Communication.

A. *Knowledge and communication.*—A necessary corollary of the positions developed in this argument is the inseparability of knowledge from communication. Plato's statement that knowledge is judgment plus discourse, with which we started, means that knowledge, in any full and significant sense of the word, has not eventuated until judgment is communicated and confirmed. In this he was undoubtedly right, his only oversight being that discourse is not something *added* to judgment, but is present, either overt or potential, in all judgment itself. It cannot, indeed, be said that that which cannot be expressed is not real, but it certainly can be said that that which cannot be expressed cannot be determined as true

or false. Moreover, to determine whether it is true or false, it must be expressed, and such expression involves discourse and confirmation.

This general position is, it is true, questioned by many philosophers. It is often maintained that communication, and confirmation by other minds, is not intrinsic to the knowledge function itself, but is, so to speak, merely an accidental *addendum*. Knowledge and verification, without which knowledge is scarcely conceivable, is essentially solipsistic. Confirmation has only a social value and adds nothing to knowledge itself. I confess that it is difficult for me to understand what this can mean. I see no objection, to be sure, to allowing the individual to speak, if he wishes, of his own incommunicable 'truth', but I do see every objection to his saying that he can confirm or verify it without its being communicated. He may speak of a knowledge by 'simple acquaintance', if he will—although I personally know of no case of knowledge without an element of description—but in the simple acquaintance he *knows* nothing; he simply *has* sense data or feelings. In other words a wholly solipsistic knowledge, still more verification, is for me an *Unding*.

On this point, then, I hold, the logical positivist is wholly right, and the gradual shifting of emphasis in his theory from the notion of verification to confirmation is as sound as it is inevitable. It is for this reason also, of course, that the problem of language becomes basal in any theory of knowledge. The only question is whether the theory of language and communication developed in logical positivism, will bear the weight put upon it. Into this large question of the nature of verification and confirmation I cannot go here. I will merely suggest that, once we find the locus of knowledge in confirmation (and therefore discourse), everything depends upon our *theory* of communication. For myself, I do not believe that a purely naturalistic or behavioristic theory will bear the weight of knowledge when it is made to depend upon discourse. As Kant saw, it is solely by virtue of transcendental elements in knowledge that intelligible communication is itself possible. We may likewise say that, in so far as knowledge, in any full and significance sense, implies discourse, the communicating subjects must be transcendent. They must transcend the empirical

flux of experience, if confirmation of the experience is to be more than a form of behavior. Communication itself cannot be naturalistically explained because it is already presupposed by the science which does the explaining.

B. *Communication and idealism and realism.*—I pointed out at the beginning that the fundamental character of the problem of communication has been recognized by all types of philosophic thought, realistic, idealistic, and pragmatic. The latest philosophical work to make communication fundamental is E. G. Spaulding's *A World of Chance*. His essential point—and this is the only aspect of his very keen discussion that I have time to refer to—is that, unless we postulate entities or essences *independent* of the knower, communication cannot be made intelligible. With this argument—that communication presupposes the mutual acknowledgment on the part of communicating minds of such objects—I am in entire agreement. The dialectic by means of which he shows the impossibility of communication on subjectivistic or pragmatic premises I find unanswerable, and believe it to be the one fundamental argument for a necessary realistic ingredient in any philosophy. Spaulding does not find himself justified in extending this argument to cover values as having essential being independent of the subject. To my mind, however, a realism of values is as necessary a postulate of intelligible communication as a realism of non-value entities. Intelligible communication is, as our analysis has shown, as much conditioned by the mutual acknowledgment of values, upon which ultimately all meanings depend, as upon the mutual acknowledgment of things.

"Realism" is then a necessary condition or presupposition of intelligible communication. But an equally necessary condition is an idealistic ingredient. For, after all, transcendental selves, mutually acknowledging the independent entities, are as much a condition as the independent entities mutually acknowledged. This is the essential point of Husserl's transcendental monadology, and it is the fundamental reason for the idealistic trend of his later writings. Now it was Royce, as we have seen, who, among American philosophers, saw most clearly this fact. It is true, as I have pointed out elsewhere, that it was a distinct disservice to philosophy when

Royce, under the influence of the *Psychologismus* and *Sociologismus* of his time overemphasized the sociological in his descriptions, and in so far tends to justify the statement of Dewey. But it is a mistake to exaggerate this aspect. For Royce the category of communication is fundamental in knowledge and there is no question that the community of minds he envisages is metaphysical and not merely sociological.

Knowledge therefore, and the communication or discourse with which it is bound up, presupposes an element of both realism and idealism. No coherent theory of communication can be developed on subjectivist premises, and if idealism involves subjectivism, idealism must be abandoned. On the other hand, no coherent theory of communication can be developed without the notion of transcendent mind as well as transcendent objects. Any form of realism that denies this must be abandoned. I should further add, that if both realistic and idealistic presuppositions are necessary for a valid or intelligible theory of communication, then no philosophy, since any philosophy presupposes such communication, can ignore either element in its total structure. That is part at least of what I mean by saying, as I have in various contexts, that a valid philosophy must be "beyond realism and idealism". It must be beyond the distinction or opposition, in the sense at least that it must include both. I would not go so far as S. Alexander and say that "no sane philosophy has ever been exclusively realistic or idealistic", but surely no adequate philosophy ever has.

C. *The primacy of linguistic communication.*—A further corollary of this general position we may describe as the primacy of language in all communication. All knowledge to be knowledge must, we have seen, be expressible. That which cannot be expressed cannot be said to be either true or false. All adequate expression, however, must, I shall maintain, be linguistic, for only linguistic communication is ultimately intelligible.

This primacy is challenged from two sources, both art and science. There are, it is maintained, media of expression, languages in the wider sense, in both art and science, which afford more adequate means of communication than language in the sense of speech. Indeed, it is one of the characteristic tendencies of our

modern 'depreciation of the word' to hold that it is precisely the ideal of thought and its communication to break through the 'husk of language' to non-linguistic forms of expression.

In the sphere of art it is often maintained that more can be communicated by non-linguistic symbols than by words. This is notoriously true of those theories of music which derive from Schopenhauer, for which music is the most metaphysical of the arts, in that it communicates directly the very will itself. But it is likewise maintained by many recent aesthetic theories (such as those of Dewey and Prall) of the arts in general. "Art", writes Prall, "is necessarily the nearest approach to anything like adequate communication" (*Aesthetic Analysis*, 183). "Our very need of the arts", he continues, "their unique functional value rests upon their expressing and thus communicating—what language cannot express directly in any case; for what language gives us directly is only words, conventional symbols, the meanings of which is found only in concrete non-verbal content". "Language", he points out, "cannot name the feeling here given [in a Cézanne landscape] for language cannot reach, in these regions of light, color, and volume, the specification that constitutes the quality of an actual determinate, individual picture".

Now these statements may be accepted as true up to a point. There is that, doubtless, in the picture which language cannot express directly (although it may perhaps indirectly); but what is it that is expressed? It is real, doubtless, but very limited. It is, by the writer's own admission, simply the specifications of light, color, etc., and "the vague feeling which cannot be named". I am, of course, entirely willing to admit that in a landscape by Cézanne, there is actually communicated much more than the light, color, and the peculiar feeling—let us say the artist's way of envisaging reality. But when we ask what this is, that is what the picture 'says', there is no way of answering it except in terms of language and the universals which condition linguistic communication.

The entire issue here evidently turns on the notion of *adequacy*. Communication, unless it is merely behavioral and emotional, must say something. Such communication is the more adequate, the more it can say, that is, the more intelligible it is. Now I am not denying, of course, that art is an important form of communica-

tion, but merely that it is not the most adequate or most intelligible form. The assertion that it is, as in the case of Prall's statement, really rests upon a certain assumption as to the nature of the real which is to be expressed; namely, that it is mere sense data—the specificity of light, color, etc. But that is evidently a metaphysical assumption that begs the entire question at issue. Doubtless art can express these things better than language, but it is still a question *how much* of reality has really been expressed.

With regard to the challenge by science, the issue is perhaps even clearer. Here again, it is doubtless true that by means of the *puri nomi,* the purer notation which the mathematical symbols make possible, whatever can be said by such symbols, can be said more clearly and accurately than by words. But it is still a question of *what* can thus be said. Mathematics, doubtless, "says something about everything", but it seems equally true that "it says very little about anything". Here too, as in the case of art, the question is what it is that the mathematical formulas say. To this we are compelled to answer: either that they say nothing, but merely manipulate; or else to tell what it is that they say in words. Here again it is not a question of denying that mathematical symbols are a form of intelligible communication, but merely that they can be the final and adequate form. Here, again, as in the case of art, the assertion that non-linguistic symbols are more adequate than linguistic really rests upon a certain assumption as to the nature of the real to be expressed; namely, that it is ultimately a system of functional relations. But that again is evidently a metaphysical assumption which begs the entire question at issue. It may be that such relations, far from being the ultimate nature of the real, are merely its skeleton structure—or even an abstraction—for certain specific purposes. In any case, until the mathematical language is interpreted, it "says nothing".

The real issue then, in both cases, is what these non-linguist symbols say. For after all, all communication which is not merely emotive and behavioral, says something; intelligible communication cannot be divorced from language. It is possible, of course, to say that art says nothing, but merely evokes emotions. That is, however, I think, an extreme position which cannot really be maintained. Again it is possible to say that mathematical symbols say

nothing, but merely manipulate, that mathematics too is in a sense merely behavioral. But that also is difficult to maintain. It is much more reasonable to say that both say something but what it is that they really say can be ultimately expressed only in terms of language.[11]

This general principle of the primacy of language brings us back to the point from which we started. All life—including the life of art and science—goes back to the question of speech, the medium through which we communicate. There are undoubtedly other media through which we can communicate, but intelligible communication, in its full meaning and extent, is possible only through language.

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[11] R. Honigswald formulates this principle in the following way: "dass Adäquatheit unter allen Zeichen nur dem Wort nachgerühmt werden kann . . . dass schliesslich jedlichen Zeichen die Beziehung auf das Wort als Bedingung zugrunde liegt". *Grundlagen der Denkpsychologie*, 40.

RECENT ATTACKS ON CAUSAL KNOWLEDGE

THE progress of Science consists primarily in the increase and extension of experiences. It means also the better, that is the more systematic arrangement of those already possessed, and as far as possible the subsumption of new knowledge under already acccepted truths, which may be modified in the new arrangement. Without some factual elements science is devoid of any real basis, as is the philosophy which is without scientific knowledge: a truth which the greatest systematizer of antiquity clearly recognized. Facts founded on observation and experiment, laws, approximate generalisations, theories, and hypotheses go to make up the content of the sciences, which are always in the making, owing to the discovery of new facts, new relations, or the appearance of new phenomena. The facts of science are the most stable element in the system. Next to them in logical order, or methodological validity, come the laws or invariable formulae: after them follow theories and hypotheses.

In the case of all measurable phenomena, scientific laws tend to be expressed in mathematical form: for instance in physics a law is a formula expressing an invariable relation between changing phenomena: and in Newtonian physics laws assume the form of differential equations. How such invariable relations are established is the main problem of inductive logic or scientific methodology. Sometimes such formulae are only preliminary to wider and more important ones, in which they are included and at the same time explained. It is a mistake, however, to suppose that in this process they are always discarded and the uncertainty of scientific knowledge thereby illustrated. The progress of science is not so destructive as Sir James Jeans has recently suggested. The Newtonian physics does not, *e.g.*, resemble a building lying in ruins. The facts on which Newton based his law are still true; the law is of great value, even though it is shown to be a special case of Einstein's more comprehensive formula. Similarly the empirical kinematic generalisations of Kepler were not refuted or rendered valueless by Newton's dynamical formula, but were subsumed under, explained, and corrected by it. Scientific generalisations are not as a rule completely demolished; they are modified and extended in order to explain a wider range of facts.

The theories of science, which aim at giving the causes of the laws, represent a more fluctuating element in the system; they are difficult to establish because of the difficulty of proving, that a given theory is the only one which accounts for all the relevant facts, and at the same time explains the formula or formulæ by which they are connected. This difficulty is eminently illustrated by the non-acceptance of any *one* theory of biological evolution; although evolution in general, including human evolution, can be regarded as established; which shows how closely theory and hypothesis are related. Between the two it is not always possible to draw a sharp line, at least in practice. A probable hypothesis may be termed a theory. A hypothesis is any supposition which is made, usually on evidence admittedly insufficient, in order to deduce from it conclusions in accordance with facts which are known to be real. It is a mental construction which contains a tentative explanation and which may lead to the observation of new phenomena. Although the least stable and most fluctuating factor in science, hypotheses supply the dynamic element, the factor of scientific imagination without which the advance of science would come to an end. They are thus more than mere scaffolding, as Ernst Mach maintained, merely set up in order to be removed as the scientific building advances. Newton's rejection of hypotheses which has been the source of discussion down to the present time, considering his sport of indulging in them, depends on a certain definition of hypothesis. "Whatever is not deduced from the phenomena is to be called a hypothesis." Suppositions which resorted to first or final causes or assumed *a priori* knowledge of phenomena were condemned. Newton saw a prime instance of such attempted explanations in the Cartesian theory of vortices. Of some current psychological theories, *e.g.*, the Freudian belief that all behavior is motivated and that whatever is feared is unconsciously desired, it would be saying too much to designate them scientific hypotheses.

Logically prior to the results of experimental science is the well-known principle of causality, the principle of the unideterminism of events, first critically and comprehensively examined by Hume. Sceptical as he was regarding a rational basis for it, he nevertheless upheld it as the principle involved in all inference from

the observed to the unobserved; in all intelligent anticipation of experience, whether physical or mental. While his view of a causal relation has been recognized as too indefinite, largely due to his neglect of quantitative determinations, yet the importance he attributed to the causal principle has been generally upheld except by extreme rationalists on the one hand, and by romanticists on the other, who afford an interesting instance of the meeting of extremes in philosophy, a phenomenon so frequently exemplified in commoner spheres. Thus the British Parmenides, F. H. Bradley, whose influence is reflected in Sir James Jeans' *New Background of Science,* tried to show that the application of the fundamental concepts of experimental science, including that of causality, unavoidably involved, on account of their limitations, contradictory statements (not mere difficulties), which could be overcome only by leaving the world of sense-perception and exact science, and resorting to an Absolute, reached by an illogical manipulation of the logical principle of non-contradiction. The logical fallacy involved in the procedure consisted in identifying the irrational, in the sense of not being founded on the principle of non-contradiction, with what is positively contradictory.

On the romantic side of philosophy, if manifestations that follow no method can be termed such, Bergson has been the leader of an attack on scientific method on the ground that it falsifies reality by simplifying it through the use of language and analysis which the insects do so happily without. Intelligence is, according to him, a will-of-the-wisp, which limits and misleads those who employ it, including, at times, it seems, Bergson himself. Devoid of it, but equipped with intuition or instinct, the Ammophila wasp is able through a feeling of 'sympathy' to penetrate into the anatomy of certain caterpillars, without any instruction, and paralyse, through stinging, them at the appropriate nerve centre. Bergson considers such performances as wonderful: but if they are, it is because they approximate to, or seem to resemble, the operations of intelligence. The facts, however, are not as assumed by Bergson, who relied on the observations of Fabre. Later and more careful investigations of the Peckhams have undermined the arguments on behalf of the superiority of instinctive behavior of cer-

tain insects, whose operations rather resemble the unintelligent acts of bungling plumbers.[1] Not even in the sphere of human affections, where it might be considered peculiarly efficacious, is intuition or instinct infallible: A fundamental error in Bergson's criticism of science is the assumption that intelligence is limited to analysis, whereas in all application of scientific method analysis and synthesis go together, and outside of pure mathematics, their results require to be, and are, submitted to the control of fact, through either observation or experiment.

At the present time those who depreciate a strict adherence to scientific concepts and principles appear to have received fresh support from an unexpected quarter, namely, from science itself in the persons of certain mathematical and experimental physicists, who have made a direct attack on what has hitherto been regarded as, at least, a heuristic principle, if not an indispensable foundation of experimental knowledge. "For the first time in history", writes Bertrand Russell, "determinism is now being challenged by men of science on scientific grounds. The challenge has come through the study of the atom by the new methods of quantum mechanics."[2] Among the leaders of this attack are Sir Arthur Eddington and Professor Niels Bohr, and although eminent physicists like Einstein and Planck, and many other scientists dissent from it, yet the arguments put forward have appealed to anti-scientific philosophers, and especially to those who are inclined to believe in the freedom of human volition.

The main argument has been so frequently put forward in recent years as to be well known. It turns on the inability to determine simultaneously both the position and momentum of an atom; the measurement of an electron's velocity is inaccurate in proportion as the measurement of its position in space is accurate; and *vice versa*. There is an initial uncertainty which excludes any prediction of how the atoms will behave in given cirsumstances. This uncertainty (of knowledge) involves a variety of alternatives; and although it may be possible to estimate in what proportion the different alternatives will be followed, yet it cannot be

[1] See Lloyd Morgan, *Animal Behaviour*, 74 ff. It seems certain that the behavior of the wasp in stinging is indefinite and shows no insight into the anatomy of the victims. Its behavior is in other respects stupid.

[2] *Science and Religion*, 158.

said with assurance *which* course will be followed in any individual instance. The use of such words as 'chosen' or 'selected' should be avoided.

Does this argument against causal determination based on the behavior of the atoms rest on anything more than present ignorance? Or has it any positive value? Is not our detailed knowledge of the atoms quite recent? And may not an increase in it disclose differences of antecedents in cases of different behavior? The problem here raised is not specially connected with the complicated calculations of sub-atomic physics. Long before quantum mechanics came on the scene, was there not something analogous to the above in the kinetic theory of gases? According to the latter, a gas consists of a large number of molecules moving about in all directions with different speeds; and all that could be calculated was the average speed and direction of the particles. This meant, according to what is now said by the indeterminists of physics, that the formulae dealing with, and allowing us to colculate, the movements *in gases* were only statistical, not directly causal ones. But Sir Arthur Eddington, Professor Niels Bohr, and Exner (first), go so far as to maintain or suggest that statistical formulae or 'laws' (so-called) are all that science can expect to attain; they are ultimate and take the place of causal laws, instead of being, as hitherto supposed, derivable from them. Are the implications of such a position clearly understood?

Statistics show that in certain countries 104 to 105 male children are born as against 100 female. While there may be no regularity in the proportion of the sexes born in any one family, there is a certain regularity in the births throughout the whole population. Here is a statistical 'law' or approximate generalization, as J. S. Mill termed it, which in no wise conflicts with belief in the existence of causes determining sex in each individual instance. A determinist could very well argue that, if there were no such causes or laws determining sex, even though still unknown, there would be no statistical formulae either.[3] "If a single

[3] Even though it may be admitted that the validity of the law of causation is not involved in the mere calculation of probabilities or chances. See Brunschvicg, *L'Expérience humaine et la causalité physique*, 368. If the quantities which figure in the 'laws' of quantum mechanics make no claim to describe physical reality itself, but only the probabilities of the occurrence of a physical event, is it not legitimate to raise the question, whether these 'laws' are not transitional stages in the development of experience?

atom be lawless, why should there be this regularity as regards large numbers?" asks Bertrand Russell pertinently.[4]

It is maintained in quarters that are not wholly sympathetic to the atomic indeterminists that the criterion of causation is successful prediction: that the value of a law consists in successful calculation.[5] Now successful prediction is possible only where, and when, the conditions or factors are known to be simiuar to those on which the respective causal belief is based. We predict with assurance that the sun will 'rise' tomorrow, assuming that the laws of mechanics will remain unchanged. A certain substance called bread has nourished us yesterday; we anticipate a similar result from its consumption today, assuming that it is of similar composition, which can be ascertained. Where experiment is possible, similar conditions can be re-established and the causal relation verified. Where observation alone is possible it is much more difficult to predict what will happen even in the case of larger-scale phenomena, *unless* there has been a frequent repetition, as in the instance of the movement of the planetary bodies. One might be able to predict that a man is about to commit a crime, say a theft, without being able to say just exactly, with what means this will be effected; for these may vary from hour to hour along with the environment, and be impossible to foresee. Meteorologists do not infer absence of causal connections in the matter of the weather, because three-tenths of the weather forecasts for twenty-four hours are erroneous; nor are the predictions of no use on this account. Again, causality is an assumption of history. Every scientific historian is a determinist; he does not allow himself to indulge in the supposition of a freedom of the will; for this would disturb, indeed, undermine, all his analyses and syntheses.[6] And yet in history, successful prediction is very rare, because historical events are so largely unique. At most there are parallel cases. It is doubtful that there is any genuine historical law as distinct from

[4] See also *Philosophical Review*, Nov. 1935, 541 ff. "The existence of an objective limit like Planck's quantum is a sure indication", declares its discoverer, "that a certain novel law is at work, which has nothing to do with statistics". *Philosophy of Physics*, 28.

[5] *Cf.* M. Schlick, in volume entitled *Causality*, 120 (Univ. of California Publications).

[6] See Bernheim's masterly *Lehrbuch der historischen Methode* 6[e4], 99 ff. "Alles erfahrungswissenschaftliche Erkennen ist Erkennen von Kausalzusammenhang".

psychological and economic laws. Comte's celebrated generalisation regarding intellectual progress, which perhaps comes nearest to a historical formula, is rather descriptive of a tendency than a law. As a matter of fact, all causal formulae, even in physics and chemistry, have to be expressed in conditional or hypothetical form, indicated by such words as *if*, or *when*, their logical statement being *if* (A. B. C.), *then* (M. N. O.). Their application depends on a repetition of similar instances, which, when experiment is possible, can be realized. Scientific generalisation is based on causal knowledge, and proceeds according to the principle of identity.

While some physicists, including Professors Dingle and C. G. Darwin, have condemned the application of the Uncertainty Relation, which has been erected into a Principle of Indeterminacy, to the problem of human free-will on the ground that in actual fact the latter has not been shown to have any relation at all to physics, other scientists wish to infer from the non-predictability of the activity of atoms something that is emotionally agreeable to them with regard to human behavior, namely its non-determination or freedom. Allowing that freedom in an ethical sense has a positive meaning, an undetermined will would have the power of causing large-scale movements besides those resulting from the laws of large-scale mechanics. But physicists are agreed that those laws are not changed by quantum mechanics, except that, instead of being certainties, they represent very strong probabilities.[7] It is a most improbable hypothesis that there is such a peculiar instability in nervous matter, and particularly in the brain, that an act of volition may lead an atom or group of atoms to one choice (?) rather than another, although the possessor of the volition knows nothing of the grouping of the atoms themselves. Whence comes the act of volition? Out of nothing? Or out of a soul, the

[7] See C. G. Darwin's *New Conceptions of Matter*, Chap. IV. The concept of probability is made the ultimate foundation of the whole of physics, remarks Planck, because quantum physics has culminated for the present in the theory of wave functions, and the wave function is, in itself, no more than a probable magnitude (*Philosophy of Physics*, 76). Planck does not regard this position as final. Does it not involve an error of method to test the validity or even usefulness of a general principle by reference to a theory which may be transient? The theory of relativity on the other hand is based on a strict application of causality. The fact that physicists, *e.g.*, Sir James Jeans, admit that the wave picture has not banished the particle-picture from science suggests that neither may be final.

existence of which is not supported by scientific psychology? Once more passing over the ambiguities and negative quality of this freedom, at what point does it intervene to direct the physical and chemical processes in the brain? It is not possible even to attempt an answer to this question. Continued researches in psychology and physiology tend to support the existence of causal connections throughout: they give no support to the supposition of uncaused volitions. Judging by the past history of science, it is not improbable that new facts will be forthcoming which will abolish the supposed 'freedom', or as it would be better designated, the indetermination of the atom, unless we have here reached a limit of observation and experiment, which is perhaps probable. If the attempt to know introduces a new factor and hence a difficulty into the experiment of determining certain microscopic processes, this is not an argument against, but for, causal influence, even though it may render a theoretically exact determination impossible with our present means of experimentation. And this should not surprise us, "when we consider that the instruments themselves consist of atoms and that the accuracy of any measuring instrument is limited to its own sensitiveness. A weigh-bridge cannot weigh to the nearest milligramme." "It may be regarded as certain", declares the founder of the quantum theory, "that Planck's constant constitutes an objective limit beyond which the physical measuring instruments we possess cannot reach".[8]

"Indeterminism is quite an illogical concept. What is meant by it?", asks Einstein. "If I say that the average life-span of a radioactive atom is such and such, that is a statement which expresses a certain order, *eine Gesetzlichkeit*. This concept does not of itself involve the concept of causation. We call it the law of averages. Not every such law need have a causal significance. At the same time if I say that the average life-span of such an atom is undetermined in the sense of being uncaused, then I am talking nonsense. . . . The indeterminism which belongs to quantum physics is a subjective indeterminism. It must be related to something, else indeterminism has no meaning. Here it is related to our inability to follow the course of individual atoms and forecast their activi-

[8] *Philosophy of Physics*, 26 and 28. It would mark a limit in the application of causality. See also H. Bergmann: *Der Kampf um das Kausalgesetz in der juengsten Physik*, Chap. IV.

ties."[9] Similarly, Sir James Jeans, who shows at times an amusing inconsistency, has said: "The indeterminism of the particle-picture seems to reside in our own minds rather than in nature." This picture is an artificial model, which is useful as a concession to the limitations of the human mind.[10]

It has been held by some biologists and philosophers that determinism is false, because in the course of evolution genuine novelties arise or emerge which could not have been predicted in advance. This is true not only in biology, but also in chemistry. There is a mysterious force, they say, which pervades things and brings about something new. Man obtained his larger brain because his ancestors felt the need of it. An animal which cannot yet see has a feeling that it wants to see and proceeds to act in a way that leads to the development of eyes. Admitting that wanting to see something on the part of a shell fish, though it does not know what seeing is, can bring about the existence of eyes, would this be an argument against causation? Would the unconscious urge not be the cause? It is interesting to notice that upholders of an emergent evolution theory in which unpredictable novelties arise do not hesitate to make predictions regarding the course of evolution itself. This is, as Bertrand Russell has done well to emphasize, quite inconsistent if, in order to escape determinism, prediction is, in the case of the activity of the atoms, regarded as impossible.

That causality is at least a *postulate* of experimental science, seems hardly disputable. Sir Arthur Eddington who writes of the revolution of theory which has expelled determinism from present-day physics, interestingly enough admits that determinism is not disproved by physics. But he places the onus of proving it on its supporters:[11] and it appears that the proof is to be based on continued and never-ending experiments.

"The chain of cause and effect could be quantitatively verified",

[9] Planck, *Where Is Science Going?* 202.

[10] *Presidential Address*, British Association for Advancement of Science, 1934, p. 10. In the same address, the author declares: "The particle-picture seems to make fate more powerful than ever before"; but the truer wave-picture is also deterministic, *ibid.*, 12, 13. *In the Sir James Halley Stewart Lectures*, London, 1935, Jeans wobbles over determinism, of which he has an unphilosophical conception: *ibid.*, 36. "We still may or may not be automata; present-day physics cannot prove that we are not, but it gives us no reason for thinking that we are."

[11] *New Pathways in Science*, 85, 87.

declares Heisenberg, "only if the whole universe were considered as a single system". It may be doubted that experimental science implies the view of the world as a metaphysical system or requires the supposition that there is only one chain of causal connection. And even if there were, it would still remain impossible to verify quantitatively, 'the chain of cause and effect', because, as Kant pointed out one hundred and fifty years ago, it is not possible to follow with either our sense-organs or means of experimentation, *all* the changes of matter. "When we watch the waves breaking on the sea-shore", says, similarly, one of the leaders of contemporary physics, "we have every right to feel convinced that the movement of every bubble is due to strict causal law, although we could never hope to follow its rise and fall, still less to calculate it in advance".[12] The appearance of a new star in the heavens cannot be predicted from our knowledge of the solar system; such an event cannot be foretold and cannot always be explained; and yet, there is no reason for supposing that it is not determined, or that it conflicts with causal knowledge. Whoever supposes the opposite must uphold the origin of a change *de novo*, or of something out of nothing. The principle of causality, the principle of the uni-determinism of events, is not especially a law of physics, but a regulative principle of human experience generally.

All the recent pronouncements that science, including physics, can do without the concept or principle of causality, appear to us as indications that those who argue in this way are not studying nature or aspects of existence, but are merely concerned with a world of mental or mathematical models. They have given a special meaning to the term 'event', which does not mean a physical occurrence, but a mathematical process, substituted for that given to our senses and measuring instruments. It is connected with, and relative to, the world concept of quantum mechanics, and is to a certain extent arbitrary. It is a form of ideal put forward in order to avoid the inaccuracy inherent in every measurement, and shows the tendency in recent physics towards the absolute. It belongs to a world of symbols which contain components

[12] Planck, *Philosophy of Physics*, 25.

that may have no meaning when applied to the world of sense perception.[13]

There is really as much determinism in the world of quantum physics, as Sir James Jeans and others have maintained, as there is in the world of classical physics, the crowning of which is seen in the theory of relativity. "The magnitude which is characteristic for the material waves is the wave function by means of which the initial conditions and the liminal conditions are completely determined for all times and places." But the relation between the symbols of the world of quantum mechanics and the world of sense-perception is uncertain and indefinite. The use of the term wave and wave-function here may be quite misleading. In the perceptual world of classical physics, a wave is a definite physical process, perceptible and capable of direct measurement, whereas in quantum physics it denotes only the probability of a certain state. In the latter, the concrete qualities of events from which our knowledge of objects is derived, becomes smothered in space-time which is highly abstract. "The determinism of the wave-picture", declares Sir James Jeans, "has nothing to do with the course of nature".

But ultimately it is the events of the sensible world that matter, and the desideratum here is to know their connections and calculate them in advance as exactly as possible. It is surely possible to make an exact pendulum experiment without taking into account the influence of the observer, or the state of matter in Tokyo or Cape Town (the experiment being made in New York). It is possible to predict exactly a solar eclipse: the influence of the subject of the prediction can be eliminated, and the event itself and the measuring or recording apparatus can be distinguished.[14]

[13] In Professor A. N. Whitehead's *Concept of Nature* an event is just a bit of space-time and "the distinction between space-time though inherent in nature is comparatively superficial". "Events are the relata in the fundamental homogeneous relation of extension." "Events are space-time, namely, space-time are abstractions from events", *ibid.*, 21. Such events are themselves abstractions, the relations of which to concrete physical occurrences remain nebulous. The article "What is an event?" by A. E. Murphy, this *Review*, Nov., 1928, contains some acute criticism of Whitehead.

[14] These considerations can be urged against the great importance which Professor Niels Bohr attributes to what he designates the Principle of Complementarity, according to which relations of cause and effect are outmoded for atomic physics, at least. But it is doubtful that this principle.

Experimental physics, like the natural sciences, is based on two fundamental considerations or assumptions, one of these being the existence of real events independent of our sense-organs. Neither physicists with idealistic leanings, nor those who maintain the priority of the sense data as the foundation of experimental science, can get away from this belief without being forced to adopt an irrational solipsism; for experimental science implies that observations, whether physical or psychical, can be reproduced under stated conditions by different observers. It is this that renders possible agreement between numerous inquirers. And this implies that the relations between natural changes contain factors not dependent on the observer's organs or on the time or place of the observations. It is of these factors that science attempts to discover the connections.

In physics these factors have to be measured and the relations between them expressed in mathematical form. But the process of measuring will always influence and tend to disturb the event or result, and will do so all the more when the connection between the object and the measuring instrument is close and delicate. Even in classical physics errors of observation could not be wholly eliminated, but the unavoidable errors of observation could be reduced below any given limit by increasing the accuracy of the measurements. With the discovery of Planck's quantum, however, implying as it does a fixed limit of exactness, there is a limit within which fixed causal relations are not observable or traceable. The reason of this need not necessarily be looked for in any absence of connection. Those who deny causality must, as Planck has said, if they be consistent, attribute a fundamental inexactness to a universal constant like h, for this constant is a definite real magnitude. It is necessary to distinguish between the significance of the causal principle, and the conditions and possibility of its application.

J. W. A. HICKSON

MONTREAL

which is based on the facts of interaction between objects and their environment, and which is a more abstract form of the principle of indeterminacy, has a general philosophical significance, and excludes a knowledge of the qualities of the objects themselves, and the possibility of general relations obtaining between them.

THE RATIONALISTIC ELEMENT IN KANT'S DOCTRINE OF FACT

IT IS commonly maintained that the significance of the Kantian philosophy for the history of thought lies in its synthesis of the elements of empiricism and rationalism in a single system. With respect to matters of fact, it maintains with empiricism that knowledge can extend no further than the limits of sensory experience, while with rationalism it asserts that, within these limits, thought must impose certain *a priori* forms on experience if the knowledge it gives is to be regarded as necessary.

An interpretation of the history of thought which asserts that the synthesis of these elements is Kant's unique contribution to philosophy assumes that before his time rationalism and empiricism developed in relative isolation and that, as a result of this separate development, the two philosophical traditions differ radically in respect to both the formulation and the treatment of philosophical problems. But such a view of the development of thought in modern times can hardly claim the support of historical fact. That there was a continuous development of rationalism and empiricism within the single stream of thought is clearly revealed in the rationalistic influences evident in the writings of such empiricists as Locke, Berkeley, and Hume, on the one hand, and in empiricistic influences in the thought of such rationalists as Descartes and Leibniz, on the other. In Leibniz's distinction between truths of reason and truths of fact and in Hume's distinction between philosophical and natural relations we have explicit recognition of the principle that a philosophical system must embody both rationalistic and empirical elements. And these thinkers were by no means the first to take both elements into account (indeed, the very nature of thought would appear to require that some disposition of the problem of their relationship be either explicitly made or tacitly assumed), though their writings are of particular importance because in them is to be found the clearest and most systematic exposition of the implications of the distinction between that which is purely theoretical and that which has existential import.

But if Kant's was not the first attempt to combine rationalistic

and empirical considerations in a single philosophical system, it is entirely clear that his conception of the relation between the *a priori* and the experiential differed from that maintained by his predecessors. Kant, in his insistence on *a priori* necessity as applicable to matters of fact, appears to reject the radical distinction between truths of reason and truths of fact, without at the same time clearly defining the distinction between the two as a matter of degree and without giving the doctrine of the *a priori* necessity of fact the logical sanction which absolute idealism later provided. For Hume and Leibniz only truths of reason are necessary, and they are necessary because they are guaranteed by the principle of non-contradiction. The necessity of such propositions is thus certified on purely formal grounds—grounds which can never be adduced in support of any proposition of fact, however universal and necessary it may claim to be.[1]

The questions which therefore become paramount in the evaluation of the fundamental systematic differences between Kant and

[1] A conceivable objection to the contention that the systems of Leibniz and Hume provide a synthesis of the rational and empirical elements may be advanced by monists of an Hegelian or Bradleian variety, who would argue that in terms of these philosophies there is a deep and dark gulf between truths of reason and truths of fact and that, as a consequence, the relation between the two orders must be unintelligible. Such an objection would be, in effect, that there is no synthesis, but, on the contrary, so radical a separation as to place the two orders beyond the possibility of being related. They would simply be different from each other, and, as thus differing, could have no denominator in common. It would therefore be impossible to explain the one in terms of the other or in terms of any common ground. Yet from the fact that the two orders are different from each other does it follow that their relation is unintelligible? Why it should be more difficult to think of the two orders as *other than* each other than to think of them as being of the same kind, differing only in degree, is not at all clear. Such a relation would be unintelligible only if we cannot understand one thing except as a mode of another. And to suppose that intelligibility is of this nature is to make a highly questionable assumption. For not only does it appear possible to know one thing as contrasted with another, but it is difficult to see how thought would be possible at all if we did not possess the capacity to discriminate one thing from another in an absolute, and not merely relative, sense. This is to say that the relation of difference is as intelligible as any other relation. As Johnson maintains, the presupposition of thought is the capacity of the mind to differentiate its objects by virtue of their differences from each other. That is, in order to think we must be able to recognize one thing as *other than* another. The strength of the philosophies of Hume and Leibniz—the ground of their compatibility with the implications of scientific method—lies, as I hope to show, in their maintenance of the radical distinction between truths of reason and truths of fact. The moment the necessity of reason and relations of fact are regarded as of the same order, a monism of the type advocated by Hegel, in which the distinction between thought and reality becomes one of degree only, follows. The implications of such a view for empirical science are as significant as they are difficult to accept.

his predecessors are: (1) What is the nature of Kant's conception of *a priori* necessity with respect to matters of fact, as distinguished from *a priori* necessity of a purely formal kind? (2) Is Kant's departure from the conception of factual relations maintained by his predecessors justified in terms of the argument he advances in the Second Analogy? In enquiring whether Kant was justified in making the rationalistic assumptions upon which this argument would appear—at least on one interpretation of the Critical philosophy—to depend, we shall be led to consider the nature of the *a priori* category of causality, which is supposed to provide the ground for *a priori* necessity in spatio-temporal relations. In this conception Kant believed himself to have gone beyond Hume by showing the ground of necessary connections between events in space and time, without which he believed science to be impossible. This suggests a final question regarding a point which Kant urges in attempting to justify his view of causal necessity: Are relations exhibiting an *a priori* necessity the necessary presupposition of empirical science?

II

The central argument of the Transcendental Analytic is that of the Second Analogy, which is stated in the second edition of the *Critique* as follows: "All alterations take place in conformity with the law of the connection of cause and effect."[2] The argument in support of this general principle is Kant's answer to the problem set by Hume, and in it we find the rationalistic assumptions of the Critical philosophy revealed. Hume's critical argument had been that we cannot be conscious of anything but mere succession and that the connection between events posited by the causal axiom is unjustified on any rational grounds. In reply Kant attempts to show that consciousness of such succession is possible only through consciousness of a necessity that determines the order of the successive events. This necessity, which cannot hold between the objective events themselves, is imposed on experience through an *a priori* category—in this case, the category of causality.

Conceiving the relation of causality in terms of objective change, Kant in the Second Analogy proceeds to argue from the fact of

[2] Kant, *Critique of Pure Reason*, B 232. Citations are from the translation of Norman Kemp Smith.

consciousness of an objective order in time. There is established in fact, he feels, the distinction between successions determined by the order of attentional events, *i.e.*, subjective succession, and sequences given as such, *i.e.*, objective succession. This difference between subjective and objective change he illustrates by the difference between the perception of a boat moving downstream and the perception of a house. While in the apprehension of a house the order of the perceptual events by means of which we apprehend the different parts of the house may be changed in whatever way we will (since we do not regard the order of events as representative of anything in the objective situation), we regard the order of perceptual events in the perception of a boat moving downstream as pointing to actual changes taking place in the objective state of affairs apprehended. The definitive difference between objective and subjective succession is that in the former the succession of events occurs according to a rule which forces us to combine the events in one particular order of succession, while in the latter there is no such compulsion. The necessity of the rule according to which events are combined in objective succession leaves the mind no alternative but to regard the order of succession as objectively determined, *i.e.*, in terms of the category of causality.

Since awareness of change implies awareness of the occurrence of a particular event at a particular point of time, particular events are dated and thus become established in a temporal scheme in which one dated event stands in relation to preceding events. But the analysis of objective perceptual experience shows that an event cannot be placed in the objective temporal scheme unless it is regarded as related to antecedent events according to a necessary rule. From the fact, therefore, that the law of necessary connection in time is the law of causality it follows that objective change depends on the awareness of a given event as having followed another event immediately preceding it according to a necessary rule. Kant has thus sought to show that the principle of causality is the necessary condition of consciousness of objective succession. The question which we must now ask is whether the argument as it thus stands establishes the conclusions which are necessary if Kant's view of the nature of the causal relation is to be maintained.

Thus we must enquire into the nature of the necessity which Kant believed himself to have established in this argument. This will be more easily made clear, I think, if we first consider in what respects the view of universality and necessity assumed in Kant's conception of causality differs from that maintained by the empiricist Hume. It will be remembered that Hume in his critical argument had shown that there are no valid rational grounds for the conception of causal necessity as holding between successive events. All that can validly be shown is mere succession of events. However frequently a given succession may be repeated, there is no way of showing any necessary connection between any two successive events. Not only does experience thus fail to provide any ground for necessary connection, but reason is equally impotent. The doctrine that everything which exists must have a cause is neither intuitively nor demonstrably certain. For the causal relation is a matter of fact, referring to external events, and intuitive certainty is restricted to relations between ideas. And we can demonstrate the proposition that every new existence or every change in existence implies a cause only if we can show that it is impossible for a thing to exist without some cause or other. This cannot be shown, for there is nothing self-contradictory or absurd about the conception of a thing as not existing at one moment and as existing at the next moment without the intervention of a causal principle.

As a result of this analysis, Hume is forced to base the necessity which he recognizes as essential to the notion of causality on grounds other than the empirical ones adducible in terms of impressions of sensation or the rational grounds he has rejected. Causal necessity is accordingly grounded in the transitive impulse of the imagination. Because of the constant conjunction of events, certain beliefs are established, and these in turn give rise to an impression of necessity. This impression of necessity is not an impression of sensation, for Hume had already shown that such impressions are incapable of providing any ground for causal necessity. It is an impression of reflection. Of the "several degrees of evidence" obtaining for cognitive experience, *viz.*, knowledge, proofs, and probabilities, the causal relation belongs to the second class. It is thus distinguished from the logical certainty characteristic of relations between ideas on the one hand, and the mere

probability which holds for contingent facts, *i.e.*, all matters of fact other than those causally related. Hence from the very nature of Hume's conception of belief it is clear that proofs can never be absolute. A proof "must arrive at its perfection by degrees", developing in experience from instances in which no lasting effect is produced to the state in which, because of constant conjunction, there is complete belief in a causal relation.[3]

Thus the necessity postulated by Hume in his conception of the causal relation is what might be called an empirical necessity. The nature of this type of necessity may perhaps be more clearly revealed by contrast with logical necessity. Because logical necessity has a purely formal warrant, it is characterized by absolute universality, which on formal grounds excludes the possibility of a single exception. Hume, in referring to the psychological basis of logically necessary knowledge in direct intuition, defines such necessity as holding only of relations between ideas, so that what is logically necessary involves no reference to the contingencies of existence. While for Hume the felt force of causal inference results from the psychological tendency of the mind to pass from cause to effect, logical necessity "lies only in the act of the understanding, by which we consider and compare these ideas".[4] We may take the implicative relation between a universal affirmative and its contradictory as an illustration of the formal certification which holds for the relations involved in truths of reason. If all A's are B's, then it is clearly impossible for A ever to be Not-B. For to assert that all A's are B's is *ipso facto* to exclude the possibility of any instance of A being Not-B, by making the latter inconceivable under the conditions given. The absolute universality characteristic of such logically necessary relations as that between these propositions follows from purely formal principles; no exception can be admitted without denying the intrinsic character of thought by abrogating the very laws which constitute its essential nature.

In contrast to logical necessity thus defined, it is the nature of empirical necessity that to its rule as exemplified in any generalization concerning matters of fact an exception is always

[3] Hume, *A Treatise of Human Nature*, 132. References are to the edition by A. D. Lindsay in the Everyman's Library series.
[4] *Idem*, 164.

possible in the course of future experience, for the contradictory of any matter of fact is conceivable in the sense that no self-contradiction is involved in thinking it. That this is not true with respect to a truth of reason follows from the impossibility of the contradictory, it being inconceivable that a thing both be and not be the same thing at the same time. It is, of course, true that the occurrence of any exception to an accepted scientific law provides a refutation of it as an adequate expression of fact and requires the formulation of a new law covering the exception as well as the instances previously accounted for; but this point, which concerns the relation between observed fact and its mathematical expression, may be deferred for later discussion. The fact that every causal induction is in principle always subject to the testimony of future experience is evidence that empirical science acknowledges the possibility of exceptions to its generalizations and denies in effect that *a priori* necessity is applicable to matters of fact. To take the most general example of an experientially certified proposition concerning factual relations, we observe that, while we are accustomed to accept the proposition 'Every event has a cause' as universally true, the logical possibility remains (since it is not logically inconceivable) that an event may be uncaused. As Hume's analysis of the causal relation points out, there is nothing self-contradictory in the notion of an uncaused event. The ground of our ready rejection of this as a possibility must therefore lie in experience. Since in fact we have never apprehended what we know to be an uncaused event, experience makes it difficult for us to believe that there are any such instances. But because the empirical necessity asserted in generalizations concerning matters of fact is thus always experientially certified, the limit of its unqualified application is determined by the limits of experience. Hence knowledge derived from experience does not enable us to legislate for future experience; it can only indicate the possible forms which experience may take and the probability that relations between events not yet actualized will resemble those hitherto observed.

In what respects, now, does the conception of necessity maintained in Kant's doctrine of causality differ from the view of empirical necessity just elucidated? Failing to take account of Hume's constructive argument, which was an answer to the sceptical con-

clusions implied in his reduction of the causal relation to mere empirical regularity of succession, Kant regarded his own theory of causality, which was intended to demonstrate that causal necessity is grounded *a priori* in the understanding, as alone capable of providing an adequate solution to the problem set by Hume. Since Kant holds that the necessity of the causal sequence requires a universality that no experience can provide, he insists that it can never be empirically derived. While experience may show us that one appearance customarily follows another, from this fact we cannot "argue *a priori* and with complete universality from the antecedent, viewed as a condition, to the consequent".[5]

What Kant means by universality and necessity is explained in a passage in the Transcendental Deduction, where he writes of the concept of necessary succession:

> It must either be grounded completely *a priori* in the understanding, or must be entirely given up as a mere phantom of the brain. For this concept makes strict demand that something, A, should be such that something else, B, follows from it *necessarily and in accordance with an absolutely universal rule*. Appearances do indeed present cases from which a rule can be obtained according to which something usually happens, but they never prove the sequence to be *necessary*. To the synthesis of cause and effect there belongs a dignity which cannot be empirically expressed, namely, that the effect not only succeeds upon the cause, but that it is posited *through* it and arises *out of* it. This strict universality of the rule is never a characteristic of empirical rules; they can acquire through induction only comparative universality, that is, extensive applicability. If we were to treat pure concepts of understanding as merely empirical products, we should be making a complete change in [the manner of] their employment.[6]

We must observe that the necessity thus characterized plainly cannot be logical necessity, for, as has already been indicated, the contradictory of a proposition stating a matter of fact is always conceivable. This is to say that its universality is not formally derived, but must follow, if it is to be justified, from some other principle. But, if this necessity is not formal logical necessity, it does resemble the latter in its character of absolute universality,

[5] *Critique*, A 112.
[6] *Idem*, B 123-124.

which admits no possibility of exception. For Kant tells us that in contrast to empirically derived propositions, which can have, at most, only a "comparative universality, that is, extensive applicability", the causal principle exhibits an *a priori* necessity, which provides an "absolutely universal rule". He thus categorically rejects the possibility that the necessity which his argument seeks to establish is no more than empirical necessity, the universality of the judgments of which is qualified by the contingency of future experience and as such is less than absolute. The universality and necessity which he here asserts to be applicable to matters of fact are rationalistic and absolute in that they require us to go beyond the limits of experience and legislate *a priori* for all possible experience. *This necessity, therefore, claims the same absolute universality as a mathematical proposition or any other truth of reason, but it differs significantly from the universality of the latter in lacking any formal guarantee.*

But if this conception of absolute universality cannot be justified on logical grounds, neither can it be established on the experiential grounds of objectively necessary succession which Kant invokes in his argument in support of his conception of *a priori* necessity as applied to matters of fact. *For the rule governing objective succession is based on and derived from experience, and the category which Kant establishes on it cannot validly claim applicability beyond these experiential limits.* In the case of the successive perceptions of the moving boat, it is conceivable that the relation between events might be reversed or otherwise altered. There is no logical compulsion governing such objective succession, though as a matter of fact experience shows us that such events *always have occurred in this particular order of succession* which we call the causal relation. Experience has shown us that, if we expect to see the boat drifting on the stream, we must at a later moment look down the stream rather than toward the original position upstream. The succession is objectively determined in the sense that our perception is not free to follow what order it will, as it is in the perception of a house, but must follow a rule. Such objective necessity, which is supposed to be the justification for Kant's *a priori* category, is plainly grounded in experience, for the reason we assume that there is this rule of objective succession is only

that *experience has taught us that this is always the case.*

But to the rationalistic concept of the *a priori* category, which Kant maintains only by going beyond the limits set by the terms of this argument, is gratuitously attributed the absolute necessity which is the very point at issue.[7] From the experientially certified fact that events always have exhibited this relation in experience, Kant has derived the category of causality, which states in effect: "All events in space and time have some cause or other". "All" would on this view be used in such a sense as to give a judgment of absolute universality, which would hold not only of every instance that has occurred but also of every possible event for all time to come. In thus assuming an absolutely universal judgment rather than the enumerative judgment, which, as holding only of past experience and indicating only the probability of similar occurrences in the future, alone is justified, Kant is forced to exceed the empirical limits which one element in his philosophy assigns to knowledge of spatio-temporal events. For from the very nature of events as yet unexperienced it is impossible to have any knowledge of them or of the relations in which they may stand. The conclusion seems plain, therefore, that the argument, based as it is on past experience, cannot in an attempt to legislate for all time and for every possible event in space and time validly go beyond that which is empirically given. All that Kant is justified in concluding from the materials of this argument is that every experienced event has had a cause, when the term 'cause' refers to this irreversible relation holding between events in space and time, and that there is a high degree of probability that this relation will continue to occur in future experience. But such a conclusion as this would not at all fulfill the promise of the Transcendental Deduction when it sets the justification of an *a priori* type of necessity as the task of the *Critique*.

Nor can the transcendental method in itself be advanced as a special consideration to justify the concept of the absolute necessity of causal relations. According to the transcendental method, any

[7] It is assumed that Kant in the Second Analogy is using the term *"a priori"* in the sense defined in the Transcendental Deduction, *i.e.*, as denying in principle the possibility of any exception to its rule. There appears to be no reason for holding that the conclusions Kant believed himself to have established in the Second Analogy are inconsistent with the claims of the Transcendental Deduction.

postulate is *ipso facto* established if it is required to "make experience possible"—that is, if it can be shown to be a necessary condition of experience. This method cannot be regarded as justifying the employment of the conception of absolute necessity in this connection, because the point is precisely that experience never exhibits, and by its nature never can exhibit, absolute universality and necessity in factual connections. It can show only the qualified universality which is always subject to the testimony of experience; and, of course, since experience does not exhibit any such absolute necessity, the category which provides the ground of any such necessity, so far from being a necessary presupposition of the fact, is denied on the terms of the transcendental method.

Kant's attempt to apply the concept of the *a priori* to factual relations foreshadows the complete identification of logical and factual necessity which is accomplished in the logic of absolute idealism. For absolute idealism, factual necessity of an *a priori* character is held to follow from what is, viewed from one side, the rational nature of reality and what is, viewed from the other, a logic which is an expression of concrete experience. Reality and rationality are conceived as two aspects of an experience that is organic in character. To be significant, the laws of thought must be the laws governing reality; and, to be real, experience must own a rational character. For, according to the Hegelian dictum, what is real is rational, and what is rational is real. On this view, necessity becomes that of the internality of relations, and this necessity applies to purely logical matters and to matters of fact alike. Thus it is that the thesis maintaining the applicability of the *a priori* to matters of fact has, in terms of absolute idealism, a logical sanction which Kant's view cannot claim. It will be impossible within the limits of this paper either to examine the assumptions which underlie this view of the nature of factual relations or to show the self-stultification to which this logic is inevitably committed, but it is worth while to point out that in its doctrine of the internality of relations absolute idealism denies the principle of disjunctive exclusion upon which the necessity of formal logic depends. For if, as the doctrine of the internality of all relations asserts, every aspect of experience implies every other aspect, then the complete disjunction between any predicate and its opposite, *i.e.*, its contra-

dictory, which in formal logic provides on purely formal principles the ground for the rigid exclusion of the opposite predicate upon the assertion of any given predicate, is denied. It is through the denial of the possibility of a middle ground between any two contradictory predicates that a logic of contradictories makes the negation of one proposition follow as a matter of strict logical necessity from the affirmation of its opposite. But if it is true, as absolute idealism asserts, that all identity is relative, being determined by relations that are internal to their terms, then no predicate can exclude its opposite, but rather every term must imply its opposite as a matter of principle. On this view logical necessity becomes something quite different from what it is in terms of formal logic.

III

It is frequently maintained—and this is, of course, Kant's position—that science is possible only on the assumption of a universality more rigorous than that which asserts mere empirical regularity. Only if the causal relation possesses an *a priori* necessity, the universality of which is absolute in a quasi-logical sense, it is held, is science possible, for necessity of this kind is its necessary presupposition. If this view of the nature of the necessity presupposed by scientific law is true, then Kant's conclusion concerning the *a priori* character of the causal relation is correct, even though this conclusion does not follow from his argument. We should then be faced with the task of discovering the grounds on which such a conception of necessity would be tenable. This leads us to enquire whether this is the kind of necessity presupposed by science in its causal inductions.

When Kant asked how empirical science is possible, he did not, of course, intend to suggest that it was not actual or that its conclusions were not true. In accordance with the critical method, he started from the well established fact of scientific knowledge and proceeded to enquire what its necessary presuppositions are, the validity of each condition revealed by this analysis being established by virtue of its necessity for experience. The fundamental difference between Kant and his predecessor, Hume, lies in the fact that the latter insisted that from the intrinsic nature of fact as

contingent it followed that *a priori* necessity is inapplicable to matters of fact.[8] Kant maintains that scientific law presupposes *a priori* necessity in its conception of the causal relation between spatio-temporal events. This necessity is conceived to lie, not in real connections between events in space and time, but in the imposition of the *a priori* forms of the understanding on the materials of experience. Because spatio-temporal events must thus assume the *a priori* forms provided by the categories of the understanding, it follows, upon the establishment of the category of causality as one of these necessary presuppositions of experience, that any particular event which is a cause will give rise with *a priori* necessity to the event which is the effect. Thus, while an exception to such a rule of succession would not be inconceivable in the sense that to think it would result in self-contradiction, it would be regarded as unthinkable because the rule of *a priori* necessity in terms of which the causal relation is conceived implies an absolute universality. This conception of *a priori* necessity as applicable to matters of fact, we have seen, cannot be defended on either experiential or rational grounds.

Is such a conception of necessity presupposed by science? In answering this question we may first observe that it is true that the occurrence of a single exception to a scientific law is sufficient to refute the given law as an expression of the facts it is intended to represent. Such an occurrence would require the formulation of a new generalization, capable of accounting for the new instance as well as all of the instances covered by the rejected generalization. Thus in so far as he is saying only that to any accepted causal induction there *is* no exception Kant is on firm

[8] This would be true of Leibniz as well were it not for the fact that in his doctrine of fact Leibniz introduced, mainly on theological grounds, a special principle designed to make matters of fact certain, though not necessary. According to the doctrine of the pre-established harmony as it is expressed in the theory of the monad, the concept of each individual substance contains within itself from the moment of creation all of its predicates, so that all of the predicates ascribable to a given monad are determined ultimately by the will of God and in this sense are certain. But such truths are not necessary, as truths of reason are, for matters of fact are not guaranteed by the principle of non-contradiction. The contrary of a matter of fact is always conceivable and in this sense is always possible. What is from the epistemological standpoint the *ad hoc* introduction of this special principle into the Leibnizian system gave orders and direction to events and had the effect of saving the realm of fact from the contingency to which it was in principle committed.

ground, and he is further correct in asserting that as long as a causal induction is acceptable there *cannot be* any exception. This is to say that the truth of a scientific generalization depends necessarily on its being an accurate representation of the facts. It should be observed, however, that this view of the universality of causal laws is not incompatible with the conception of necessity as empirical regularity, so that, if Kant's argument meant no more than this, he would have no quarrel with even the most radical empiricist.

If Kant's conception of *a priori* necessity is to be regarded as applicable to matters of fact as they are actually given in experience, he must mean that the acceptance of any given causal law implies the impossibility of any exceptions. This principle he expresses when he tells us that "this concept makes strict demand that something, A, should be such that something else, B, follows from it *necessarily and in accordance with an absolutely universal rule*".[9] At this point his position is no longer in harmony with the principles of empirical science. For, while science assumes that every event has some cause or other, with respect to the particular causes of particular events it admits the possibility of the occurrence of negative instances in the case of all of its generalizations. And admission of this as a possibility can be interpreted only as meaning that its laws, as exemplified in relations between particular facts, can exercise no *a priori* compulsion in determining the nature of fact. Thus science does not at all suppose that its laws are absolutely universal and capable of legislating for all experience to come. Its conclusions, as continually subject to the testimony of experience, always have a tentative character. Although empirical science insists that as long as its laws are acceptable no exceptions to them may occur, it denies the absolute necessity of its laws in the admission of the possibility of negative instances which would have the effect of refuting its general propositions.

The concept of scientific law thus assumes only empirical regularity. If its causal laws implied the *a priori* determination of the character of future experience, the occurrence of a negative instance would be impossible. Science would then be faced with the necessity of denying all negative instances on purely rationalistic grounds, and, on the positive side, its task would be that of fitting

[9] *Ibid.*

experience to its *a priori* theories rather than that of conforming theories to the character of experience as it is given. Since there would be adequate *a priori* grounds for ascertaining what the character of experience must be, its method would be entirely *a priori*, needing no laboratory experiments and requiring no observational data to confirm theoretical conclusions. Confirmation of theory by appeal to fact is plainly superfluous if the nature of fact must follow with *a priori* certainty from theory.

An entirely different situation arises in connection with the mathematical formulae in which the empirical data are cast, for mathematics in its character as an *a priori* science exhibits implicative relations the necessity of which is absolute. Since the principle of non-contradiction is the guarantee of the validity of all mathematical propositions, the affirmation of a given proposition implies with an absolute necessity the denial of its contradictory. But, though the necessity of the mathematical forms used to express the facts is absolute, science denies any organic tie between the forms of thought and the character of reality, so that nothing is necessarily implied by mathematics concerning matters of fact. If the facts confirm the conclusions deductively established, if there is a correspondence between the deductive conclusion and the fact, the theory is confirmed; if the facts are other than what is indicated *a priori*, then we have good reason to believe either that we have made a mistake in inference or that the original proposition from which the inference was made is untrue. This is but to say that by purely mathematical or deductive methods we can derive no propositions concerning the nature of existence; such knowledge must ultimately be derived *a posteriori* from perceptual data. Mathematical formulae with all their implied propositions thus do not presume to legislate for future experience by showing what particular forms events *must* take, but indicate only the possibility of future experience by showing the particular forms events *may*, and probably will, take. Hence, while the formal character of mathematics precludes the possibility of any exception to its rule, the essentially empirical character of science is vindicated in the possibility of the rejection of any such formulae in the light of observed facts.

As long as we are dealing with the particular causes of particular

events, therefore, it appears certain that relations between events are not necessary in an *a priori* sense. But, when we come to consider the quite general principle which holds that every event must have some cause or other, the problem is somewhat complicated. In certain sections of the *Critique* Kant appears to hold that only the general formal principle that every event must have some cause or other is established, while the remaining problem as to what the particular causes of particular events may be remains to be investigated by empirical science. Thus it could be argued that such generalizations from experience as those with which science is concerned are not the laws of which Kant writes, that as tentative they express no real aspects of experience, and that the true laws properly characterized by such absolute universality are the guiding ideals which we approximate in the groping attempts of empirical science, serving as the criteria of the truth of scientific generalizations. That is, the laws expressing such absolute universality and necessity would be conceived as noumenal or regulative in character, while the laws of science would be no more than partially successful attempts to attain the finality of the former. There are, however, two fundamental objections to this interpretation. The first is that the effect of this sharp severance of the principle of causality from the particular situations in which it should be exemplified is to establish the principle of causality as a regulative principle at a noumenal level, where it would have no reference to the problem of causation. The difficulty here is that, in spite of Kant's avowed intention of providing a ground for the possibility of empirical science, no empirical series of events can be regarded as instances of the causal principle, defined in terms of *a priori* necessity and absolute universality. The existence of any relation exhibiting such *a priori* necessity must necessarily remain entirely problematical, being beyond the possibility either of rational demonstration or of experiential certification. The second objection is that the interpretation of Kant's position as transcending the order of relations between given events, *viz.*, as a regulative principle, contradicts the main teaching of the *Critique*. On Kant's own showing the categories are constitutive rather than regulative and therefore are in and of the order of spatio-temporal events.

Thus the presupposition of empirical science is not, as Kant main-

tains, the conception of causally related events as subject to some form of *a priori* necessity, but rather the contrary. To assume that there is such *a priori* necessity would be to make of science a purely deductive discipline. But because fact, which is inherently contingent as judged by the standards of strict necessity obtaining for implicative relations, is observed frequently not to be of the nature indicated by *a priori* calculations, science always insists on the confirmation of theoretical conclusions by observation or experiment. This entails reference ultimately to perceptual data. In thus incorporating into its method this empirical element as well as the rationalistic element of mathematics, science assumes that, while *a priori* necessity holds of relations between ideas, it does not hold for matters of fact as fact, and that, if it is to inform us concerning the nature of the physical world, it must in its appeal to observation take account of a factual order which is essentially contingent.

These conclusions, it must be admitted, are mainly negative, and the development of a positive theory of causality remains as a problem. But whatever our positive views regarding the nature of the causal relation may be, we may be fairly certain that, if Kant's contribution to metaphysics lies in his synthesis of the elements of rationalism and empiricism in his doctrine of fact, then that advance, in so far at least as it involves the application to matters of fact of a conception of *a priori* necessity of dubious rationalistic ancestry, is achieved at the expense of a *non-sequitur*.

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DISCUSSION

THE RELATIVITY PARADOXES: A FOOTNOTE TO THE LOVEJOY-McGILVARY CONTROVERSY

IN the following paper a discussion is presented of two of the curious paradoxes which some investigators feel to be inherent in Einstein's Relativity Theory. These apparent paradoxes have led many to reject the Theory, and to seek alternative explanations. An attempt will be made to show that these paradoxes do not exist within the Theory; furthermore, that the Theory in no way conflicts with our experiential sensory data, although it possibly conflicts with our intuitive knowledge. Whether objections based on knowledge of an intuitive nature are sufficiently cogent to invalidate the Theory is a large problem, and doubtlessly an important one. None the less, such problems do not lie within the scope of this paper.

There is a good deal of confusion as to the nature and magnitude of Albert Einstein's contributions to our understanding of the nature of the physical world. He invented no new methods of mathematical analysis, although his employment of existing methods is the work of a physicist whose knowledge of mathematics is unusually keen and complete; he made no startling new experimental observations. His tools were the mathematics of Riemann, Lobatchewski, Levi-Civita, and Ricci; his facts were supplied to him by Fizeau, de Sitter, Zeemann, Lorentz, Michelson and Morley, and countless others. He applied the existing tools to the known facts and brought forth a contribution of a broad philosophical nature; it was actually a new *Weltanschauung*, which, regardless of the ultimate triumph or fall of the axioms and theorems of his Relativity Theory, has succeeded in exciting a great deal of interesting and competent discussion of important philosophical problems;—problems which are as old as, and perhaps older than Aristotle, and which physicists of the nineteenth and early twentieth century had sadly neglected.

In order to place the principal discussion upon a sound foundation, a brief outline of the chief characteristics of the Special and General Theory is presented here. For the order of this analysis, I am entirely indebted to Professor W. P. Montague.[1] The important concepts of the Special Theory may be arranged in five main groups:

A. Space and Time are conceived of as relative and objective. They are objective in so far as they are measured by real clocks and rods; they are entirely relative in a sense that will be described below. Montague has pointed out that historians of philosophy have not been at all clear as to the demarcation between the concept of a relative or absolute Space and Time on the one hand, and the idea of a sub-

[1] *Phil. Rev.* XXXIII, 143; 1924. Also, Lectures in Cosmology at Columbia University (unpublished) 1936.

jective or objective Space and Time, on the other.[2] For Newton and Descartes, Space and Time were absolute and objective, while Kant conceived of Space and Time as absolute but entirely subjective. Thus, although Kant held Space and Time to be things primarily of the mind, he would have agreed completely with Newton and Descartes that Space and Time existed prior to and apart from the events and objects which occupy them. Leibniz, on the other hand, believed that Space and Time are relative and objective, just as Einstein does; that is, they existed merely as interrelations of 'monads', which had no spatial or temporal meaning in themselves.

B. The events of the world of nature are held to be identical with, and considered to correspond exactly to, the inner world of sense-experience. As Montague points out, ". . . they [the sense data] are not to be conceived as internal effects of an external world; but rather are they to be conceived of as overlapping and interpenetrating perspectives. In place of a world of extra-individual causes we are to substitute a system of inter-individual laws as the norm or standard for measuring and comparing our experiences. We are to adopt a relativistic form of epistemological monism rather than the epistemological dualism of traditional science."[3]

It might seem that this concept is implied in the theories of many modern physicists. Its importance in the Relativity Theory, however, lies in the fact that it is explicit, and is necessary for the complete idea of the Theory. There is reason to believe, moreover, that the monism of Spinoza is neither unknown nor repugnant to Einstein.

C. It was mentioned above that Space and Time, for Einstein, as for Leibniz, are entirely relative. They are as dependent upon one another as one dimension of a three-dimensional space is dependent upon the other two dimensions; there is no possibility of independent variation. It should be remembered, in this connection, that although Space and Time were considered absolute and independent in Newtonian physics, it was always customary to describe any world event as a variation in Space with Time. Nevertheless, the significance of this procedure was never fully realized, so that our old conception of temporal simultaneity may be traced directly to this unwarranted separation of dependent variables. These new considerations rule out completely any *absolute* simultaneity of two distinct events. True absolute simultaneity now demands the coincidence of four coördinates for the simultaneous events. That is:

$$\left.\begin{array}{r} X = X_1 \\ Y = Y_1 \\ Z = Z_1 \\ t = t_1 \end{array}\right\} \qquad (1)$$

[2] Lectures in Cosmology. [3] *Phil. Rev.* XXXIII, 143; 1924.

where X, Y, Z, and X_1, Y_1, Z_1, are the three spatial coördinates, respectively, of events E and E_1, and t and t_1 are the values of the fourth, or temporal coördinate.

Obviously, on the basis of these considerations, any event may be absolutely simultaneous only with itself. For practical purposes, however, two events may be considered absolutely simultaneous if their coördinates differ by small quantities, t remaining identical with t_1; that is, if

$$\left.\begin{aligned} X &= X_1 + a \\ Y &= Y_1 + b \\ Z &= Z_1 + c \\ t &= t_1 \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where a, b, and c are small with respect to X, Y, and Z, then the two events may be considered simultaneous as absolutely as two distinct events may ever be.

Max Born writes: "Now even if we cannot attain absolute simultaneity it is possible, as Einstein has shown, to define a relative simultaneity for all clocks that are relatively at rest with respect to each other, and yet it is not necessary to know the value of the velocity of the signals."[4]

Thus the Special Theory defines a new simultaneity applicable to events at a distance and consistent with the other axioms of the Theory. Einstein defines it as follows: "Let us suppose that we place similar clocks at points of the system K, at rest relatively to it, and regulated according to the following scheme. A ray of light is sent from one of the clocks, U_m, at the instant when it indicates the time t_m, and travels through a vacuum a distance S_{mn}, to the clock U_n; at the instant when this ray meets the clock U_n, the latter is set to indicate the time:

$$t_n = t_m + S_{mn}/C \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

where C is the velocity of light in a vacuum. The principle of the constancy of light then states that this adjustment will not lead to contradictions."[5]

As an illustration, suppose the clock U_m sends out a light ray at the moment it reads

$$t_m = 2{:}00 \text{ P.M.} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Suppose that the clock U_n is 11,160,000 miles away from U_m. Then, at the moment the light ray strikes the clock U_n, this clock is set to read:

$$t_n = 2{:}00 + 11{,}160{,}000/186{,}000 = 2{:}00 + 60 \text{ seconds}$$

or:

$$t_n = 2{:}01 \text{ P.M.} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

[4] *Einstein's Theory of Relativity*, 1924.
[5] *The Meaning of Relativity*, 1922.

D. As a logical consequence of the relative nature of Space and Time, the Special Theory shows that any event in our space-time continuum may be fixed definitely by four values: the first three being our old space coördinates and the fourth, the temporal coördinate. It can be shown, further, that any space-time interval, S, depends upon the linear intervals of the four dimensions in the following manner:

$$S^2 = dX^2 + dY^2 + dZ^2 - dt^2 \quad \ldots\ldots (6)$$

where

$$\left.\begin{aligned} dX &= X - X_1 \\ dY &= Y - Y_1 \\ dZ &= Z - Z_1 \\ dt &= t - t_1 \end{aligned}\right\} \quad \ldots\ldots (7)$$

X, Y, Z, and t being coördinates of the event E, and X_1, Y_1, Z_1, and t_1, coördinates of the event E_1.

Equation (6) is true for a region of Euclidean space, a condition which is approximated in the absence of a gravitational field. It tells us, further, that the space-time continuum is of negative curvature with respect to time. In order to dispose of the negative quantity in equation (6), a new function of time, T, is substituted for true time such that

$$T = t\sqrt{-1} \quad \ldots\ldots (8)$$

clearly, then,

$$T^2 = -t^2 \quad \ldots\ldots (9)$$

and equation (6) may be rewritten:

$$S^2 = dX^2 + dY^2 + dZ^2 + dT^2 \quad \ldots\ldots (10)$$

remembering, always, that T is not true time, but a closely related, and imaginary function of true time.

E. In our world of relative values the Special Theory postulates just one absolute, namely, the velocity of light. No matter what the velocity of a particle relative to any other, its velocity relative to light, or the velocity of light relative to it (which is the same thing) is always constant—completely invariant. Furthermore, the velocity of light is entirely independent of the velocity of its source relative to any third particle. These points are a direct outcome of the observations of Michelson and Morley, and of de Sitter. The nature of the crucial experiment of Michelson and Morley is too well known to require retelling here; de Sitter's observations on double stars confirm the assumption taken over from classical physics that the velocity of light is independent of the velocity of the source.

The relationship between the velocity of light and the velocities of its source and the observer is capable of four assumptions, only two of which would not conflict with the results of Michelson and Morley.

These two possibilities are:

(a) The velocity of light dependent upon the velocity of the source and upon the velocity of the observer.

(b) The velocity of light independent of the velocity of the source and of the velocity of the observer.

Assumption (a) usually takes the following form. Since light may be considered corpuscular in nature, it behaves like any projectile, and depends for its velocity upon the velocity of its source. This, together with the assumption of classical physics, that the velocity of light is dependent upon the velocity of the observer, would be consistent with the Michelson-Morley results.

Montague has suggested another interesting possibility under this same assumption: ". . . the medium or carriers of light waves is not a doubtfully existent ether substance but the certainly existent field of force which each proton and electron carries with it".[6] Light would be a definite, constant wave motion in the field, but the field itself would move with the speed of the particle, the total velocity of the light being, then, the sum of the velocity of the particle and the constant velocity of light within the field. Aside from the difficulties involved in a consideration of the effects on the velocity of the wave due to interpenetration of these fields (all moving at different velocities) this theory shares an important disadvantage with the projectile theory, namely, that the only existing observations—those of de Sitter—point to the non-dependence of the velocity of the light wave upon the velocity of the source.

The assumption of classical physics, that the velocity of light is independent of the velocity of its source, but dependent upon the velocity of the observer, is entirely untenable unless something similar to the 'ether drag' is postulated. In such a theory, light has a constant velocity in the ether, independent of the velocity of the source; and furthermore, the ether drag accompanying any observer would make the velocity of light seem invariant relative to the observer. It has been pointed out many times, however, that the currents and eddies of ether which would be set up in space as a result of this drag would have definite observable effects which have never, as yet, been confirmed.

The constancy of the velocity of light is expressed in Einsteinian physics as follows: consider two inertial systems, K and K_1, and pass a ray of light from point P_1 to point P_2 of K. Taking as the measured distance between the two points, S, then the propagation of light must satisfy the equation:

$$S = Cdt \qquad (11)$$

where dt is the time interval, and C is the velocity of light.

Now S^2, in Euclidean geometry, may be defined as:

[6] *Phil. Rev.*, XXXIII, 143; 1924.

$$S^2 = dX^2 + dY^2 + dZ^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Combining equations (12) and (11) gives:

$$dX^2 + dY^2 + dZ^2 - C^2dt^2 = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots (13)$$

This same propagation of light relative to K_1 must satisfy the similar equation in terms of the coördinates of K_1:

$$dX_1^2 + dY_1^2 + dZ_1^2 - C^2dt_1^2 = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots (14)$$

The transformation which makes equations (13) and (14) mutually consistent is the Lorentz Transformation. This takes the following form (assuming coördinates Y and Z perpendicular to the direction of motion).

$$\left.\begin{aligned} X_1 &= (X - vt)/\sqrt{[1 - (v^2/C^2)]} \\ Y_1 &= Y \\ Z_1 &= Z \\ t_1 &= [t - (v/C^2)X]/\sqrt{[1 - (v^2/C^2)]} \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots (15)$$

where v is the relative velocity of K and K_1.

The General Theory of Relativity, now, contains two fundamental concepts. These concern the nature of force itself—reducing the old problem of dynamics to one of pure geometry—and the nature of the universe as a whole—recognizing it as finite but boundless.

It is in the General Theory, without doubt, that one finds concepts most difficult to reconcile with his intuition. And it is curious that these concepts have to do, not with the relativity of things, but rather with the absoluteness of certain things. The relativity of motion is not at all difficult to understand, but to postulate all motion as relative, and yet to conceive of acceleration as absolute, in a sense, is rather trying even after careful examination of the Theory.

Einstein's railway carriage and embankment serve admirably to illustrate the concept of the relativity of motion. But suppose, now, that the carriage is halted rather suddenly. The man in the carriage is jolted forward in his seat, while the man on the embankment very obviously experiences no such effects. H. Weyl makes this point clear in the following passage:

> It is indeed remarkable that two mechanical events that are fully alike kinematically may be different dynamically, as a comparison of the dynamical principle of relativity with the much more general kinematical principle of relativity teaches us. A rotating spherical mass of liquid existing all alone, or a rotating fly-wheel, cannot in itself be distinguished from a spherical fluid mass or a fly-wheel at rest; in spite of this the rotating sphere becomes flattened, whereas the one at rest does not change its shape, and stresses are called up in the rotating fly-wheel that cause it to burst asunder, if the rate of rotation be sufficiently great, whereas no such effect occurs in the case of a fly-wheel at rest.[1]

[1] *Space Time Matter*, 1922.

This point cannot be stressed too greatly; it is involved in one of the most important and often-quoted paradoxes of the Relativity Theory.

This apparent absoluteness of dynamics does not negate the relative nature of Einsteinian space and time. A particle of matter is a warp in the flat Euclidean space, and as such presents a small region of non-Euclidean space where a geometry of a different sort is necessary. Thus, a body moving in a region of warp, while traveling on a true geodesic as regards the curvature of the warp, will exhibit a skew, or non-uniform motion as measured from a region of flat space. Obviously the region of warp is only warped as regards a rigid system of reference in the flat space; however, a rigid reference scale within the region of warp itself would show that region to be as 'flat' as the inhabitants of that region could ever hope to determine. Moreover, the distant space would be symmetrically skew with regard to the frame of reference of the region of warp. It is in this sense that the kinematical principle of relativity remains true in spite of the absoluteness of the dynamical aspect of an event.

In this connection, it is important to remember that the motion of a point in a circular orbit with constant speed is not a uniform motion, but an accelerated one; and as such the motion represents not an inertial system, but rather one where the geometry is exactly like that of any region of warp where a gravitational field is present.

Thus, such formerly diverse concepts as rotation, gravitation, and latterly electrodynamic phenomena have been unified in the new physics.

It was mentioned above that matter is simply a region of warp in flat space, according to the principles of Einsteinian physics; it has been pictured as a cusp or dent in a flat surface. As a result, three-dimensional beings will not be capable of penetration into this cusp, which of necessity extends into a fourth dimension; and they will conceive the cusp as something impenetrable—namely, matter. The space in the immediate vicinity of the cusp will be very slightly warped, and will have the effect on motion that any region of warp has; that is, it will produce an acceleration, as measured from a 'flat' reference scale, and will exhibit a field of force.

The Einsteinian concept of energy can also be made clear with the aid of the foregoing illustration. The cusp may be taken to represent an accumulation of potential energy, and if the cusp is made to disappear it must express itself in the form of a disturbance in space, which we call a transmission of energy; the cusp is, then, an amount of energy exactly equivalent to its size and shape. It is clear from this that Einstein's early hypothesis as to the equivalence of mass and energy follow directly from the ideas of the General Theory.

It was next demonstrated that a continuum consisting of these large and small groups of cusps—having the nature of 'strains' in the

'fabric' of space—would of necessity curve back upon itself. These considerations result in the conception of our space as finite but boundless. Our space, then, is the three-dimensional surface of a four-dimensional hypersphere, and is unbounded in the sense that the two-dimensional surface of a three-dimensional sphere is unbounded. A two-dimensional being inhabiting that two-dimensional surface would never be able to step 'off' of the surface, just as we cannot step 'off' of our surface, in spite of the fact that it is finite and measurable.

It is fundamental to realize that a relatively small portion of a curved surface is indistinguishable from a flat surface. It is for this reason that Euclidean analysis is so accurate for the 'empty' regions of space that we are capable of measuring at the present time. When our apparatus is such as to allow us to explore much larger regions of space, we may hope to discover the curvature in our space directly. In the vicinity of large masses, where the curvature is much greater and becomes an actual warp, the Theory has already received confirmation in the fact of the bending of light rays in such regions.

Montague has pointed out that the Special Theory is not a logical necessity on the basis alone of the General Theory. This is quite true as regards the essence of the two; however it must be realized that it would be extremely difficult to substitute alternative postulates in a generalized theory which would admit even the possibility of the postulates of the Special Theory.

We come, now, to discuss an apparent paradox in the Relativity Theory, which for the short time we have been aware of it, has excited comment and analysis comparable to that showered upon the Zeno Puzzles.

This paradox is called "The Time Retarding Journey" by A. O. Lovejoy.[8] The origin of the problem is not definitely known, but it was probably first mentioned by the Frenchman, P. Langevin. It was later given prominence by Eddington, Borel, Born, Montague, Lovejoy, McGilvary, and others.

In 1931 and 1932 Lovejoy[9] and McGilvary[10] wrote a series of articles 'at' each other, one might say, which are illuminating and important in spite of the personal nature of many of the comments. In these articles Lovejoy has stated succinctly the propositions which he considers to be the gist of the argument as follows:

> Retardations of clocks and of physiological processes are, in the Special Theory of Relativity, said to occur in any system S which is in unaccelerated motion relatively to another system S_1.
>
> These retardations are comparative; *i.e.*, the rates of standard clocks and of physiological processes in S are said to be slower than those in S_1.

[8] *Phil Rev.*, XL, 48, 152, 549; 1931. [9] *Ibid.*, XLI, 498; 1932
[10] *Ibid.*, XL, 358; 1931. XLI, 478; 1932.

But since both S and S_1 can legitimately be said to be in equal unaccelerated motion relatively to one another, equal retardations must be ascribed to the clocks, etc., in both systems.

The two clocks may legitimately be supposed to be set in motion, and the two persons to be born at the same time.

If, as is implied by the story of the twins of unequal age, the comparative lags, or retardations, are supposed to occur as physical facts in the systems to which they are referred, the foregoing propositions lead to the following contradictions: (1) The clock in each system goes more slowly than that in the other, and the person in each system ages less rapidly than the person in the other. (2) The reading of each clock on S and S_1 respectively, will be slow in comparison with the other at the same moment, and each of the two persons will be physiologically younger than the other at the same time. (3) Each clock will thus have two readings at once, and each person will be of two ages at once.

If, however, the retardations and resultant inversions of ages and readings are regarded, not as physical facts in the systems to which they are referred, but merely as a mutual disparity of appearance—*e.g.*, if the retardation of the clock or of the physiological age in S is held to exist only for, or from the point of view of, observers in S_1—these contradictions do not arise.

The set-up used by McGilvary and Lovejoy in this problem is as follows. Consider two straight platforms of indefinite length traveling past each other with a relative velocity of v mi./sec. On each platform is a point of origin, A on one and A_1 on the other. At a distance of X and X_1 respectively on each platform stands a milestone—these distances being measured from the origin on each platform. There are competent observers (or mechanical semaphore devices, as Montague has suggested) and clocks stationed at crucial points; all the clocks on each platform are synchronized in accordance with relativistic principles. Now, on January 1, 1900, at noon, A and A_1 coincide; and at the very moment of coincidence the two twins Peter and Paul are born. Paul is born at A where the clock reads $t = 0$, and Peter is born at A_1 where his clock reads $t_1 = 0$. Now at a point X miles from A as measured on Paul's platform, Paul's cousin is born, and the clock at that point reads $t = 0$. Peter's cousin is born at the time of coincidence of the point P_1 (X_1 miles from A_1 as measured on Peter's platform) with P (which is X miles from A) and at the time of birth of Paul's cousin. Now McGilvary finds a solution to the problem in the following manner:

Taking the following values for v, X, and t:

$$v = C\sqrt{91/10}$$
$$X = 7C\sqrt{91}$$
$$t = 0$$

and employing the equations of the Lorentz Transformation (15), the time of birth of Peter's cousin, t_1, at P_1 is found to be $-212\ 1/3$ seconds. In other words, Peter's cousin is born before Peter is, as mea-

sured on Peter's platform. Now, when Peter arrives opposite Paul's cousin, the clock at that point on Paul's platform reads 70 seconds. However, the clock on Peter's platform at that moment reads $t_1 = 21$ seconds. If we consider, now, the point M_1 at a negative distance $-7C\sqrt{91}$ from A_1 on Peter's platform, and let M be a point on Paul's platform coincident with M_1 at $t_1 = 0$, then t is equal to $-212\ 1/3$ seconds. Continuing the analysis with the aid of the Lorentz Transformation, we find that Paul arrives at M_1 when Peter's clock reads 70 seconds, and his own clock reads 21 seconds.

Thus, we find, that on the basis of Paul's measurements Peter's clocks lost 49 seconds during an interval of 70; for during the time that Peter traveled up to Paul's cousin, Paul's clocks showed an interval of 70 seconds while Peter's clocks at corresponding points showed an interval of only 21 seconds. However, Peter's measurements showed Paul losing 49 seconds during an interval of 70; for while Paul traveled to point M_1, Peter's clocks ticked off 70 seconds, while Paul's indicated 21. Then, when Peter arrives at P, his age by Paul's clock is 70 seconds, which is 3 1/3 times his physiological age. Similarly, when Paul's cousin arrives at A_1, his age by Peter's clock is 3 1/3 times his physiological age.

A third platform, inhabited by John, is now added. This new platform is parallel to the other two, and in uniform motion relative to them. Its velocity relative to Paul's platform is the same as the relative velocity of the two original platforms. A_2 is coincident with A_1 and A when t is zero, and t_1 and t_2 are also zero. Imagine, now, that at the moment when K_2 is coincident with P and A_1 (K_2 is $-7C\sqrt{91}$ miles from A_2 as measured on John's platform), Peter and his clock are transferred to K_2. At K_2 it can be shown that the clock reading at this time is 445 2/3 seconds. Peter, now, will reach A when Paul's clock reads 140, John's clock 466 2/3, and his own clock 42 seconds. Suppose, further, that Peter is transferred to Paul's platform upon arriving at P, and Paul to Peter's platform when arriving at M_1. Each one is 21 seconds old physiologically; when they meet, each will be 42 seconds old on his own clock.

Thus, by having Peter and Paul hop rapidly from one platform to another, McGilvary has succeeded in bringing the twins together at the same age. This might seem, at first, to contradict the statement of the paradox as put forth by almost everyone else. On examining McGilvary's method more closely, however, it is obvious that his solution applies only to a very special case, and seems to ignore the basic difficulties. He achieves symmetrical results by causing each twin to reverse his direction in such a manner that the dynamical effects upon the two are equivalent and so may be considered to cancel out. In other words, his solution is merely an extremely restricted example of the general solution which Max Born[11] gives, and which, so far as

[11] *Einstein's Theory of Relativity*, 1924.

it goes, no one has had any quarrel with. Born points out that in the case where two twins move at a uniform velocity relative to one another, and one of the twins reverses his direction, we have a system which is not covered by the Special Theory at all. There are involved three periods of acceleration: starting, turning, and stopping. The first and third periods alone would be symmetrical and might be expected to cancel one another in their effects. The second period, however, unbalances the system and makes it asymmetrical. It must be emphasized here again that the dynamical effects upon a body in accelerated motion are not relative in the Theory, and such a concept should not be read into the Theory, regardless of our preconceived notions. The twin who reverses his direction after traveling out into space, is not in an inertial system during the periods of acceleration; that is, forces are set up during these periods which are not reciprocal, but entirely one-sided. Employing the equations of the General Theory here, Born shows that when the twins meet, the one who reversed his direction will be the younger, and the result will not be paradoxical. It is now apparent that McGilvary's solution answers none of the questions that Born's solution leaves unanswered, and we are left with only a partial solution.

To dissolve the paradox completely, it is necessary to examine the notion, which is really the crux of the problem, that during the travels of the twins 'the damage has already been done' in the period of uniform relative velocity. The difficulty lies apparently in a desire to differentiate 'things as they really are' from things as they are measured. The phrase, 'things as they really are', has no meaning to the relativist. His first question will be, 'By whom are these things measured?' During the period of uniform relative velocity Paul's clocks are going more slowly than Peter's clocks. One might ask, 'Are they really going more slowly, or does it merely seem so?' They are very definitely going more slowly—as far as Peter is able to measure, or ever will be able to discover. Well, then, are Peter's clocks going more slowly than Paul's clocks? They most certainly are—as determined by Paul's most accurate measurements. It seems, at first, that we are led directly into the paradox—each clock must have two readings; but this is not at all the case, for it is the elapsed time on each clock which has two values—entirely relative values. The elapsed time on Peter's clock is neither more than, nor less than, nor equal to the elapsed time on Paul's clock, because time is not absolute; however, the elapsed time on Paul's clock is less than the elapsed time on Peter's clock as far as Peter is concerned, while the situation is just reversed as far as Paul is concerned. How a situation of this sort can actually exist is not difficult to understand; McGilvary's simple calculations show how the equations of the Lorentz Transformation force upon us this reciprocal retardation of temporal interval without demanding the slightest ambiguity as regards the reading of any clock face at any time, and by

any observer. This will be true, no matter what the arrangement may be: whether the twins start at a distance and approach each other, or proceed as in McGilvary's illustration. The equations are unequivocal on this point. Furthermore, the Einsteinian notion of simultaneity must be accepted; there can be no setting in motion of clocks 'at the same time' except in the sense that equation (3) admits. It is then apparent that there would not be two readings 'at once' as long as this 'at once' is Einsteinian.

The paradox in respect to the relative ages of Peter and Paul will vanish together with the problem of the clocks if we can succeed in breaking down the intuitive feeling which is much stronger on this point. Just as was true in the case of the clocks, the equations of Relativity force upon us—and we must accept—the fact that, as far as Paul's measurements will ever tell him, he is older than Peter; Peter, on the other hand, is just as definitely, just as 'really', older than Paul—in so far as Peter's measurments can record. Obviously, then, there is no meaning in the statement that one is 'really' older than the other, or that each is really older than the other; for such a statement postulates an absolute simultaneity when two events at a distance 'really' are one thing or another with relation to each other, and postulates also a 'someone outside' to determine just what 'really' is at any absolute moment. These ideas have no place in the Relativity Theory, and for that reason any argument which implies such concepts cannot possibly be used to develop a paradox within the Theory.

There is nothing in the above conclusions which conflicts with experiential sensory data. If a man should ever care to take a long trip on a rapidly moving space ship of some sort, and then return many years later, he will find upon his return—if he is able at all to return —that he has actually aged much less than his friends have. Such a case would admit of a solution similar to that given by Born; it would simply be noted as the effect of a rapid journey involving asymmetrical periods of acceleration, and would be essentially no different from any other effect caused by a radical variation of environment upon the human organism. While our traveler is moving in space, he may send messages to his friends and receive messages from them; at any moment (Einsteinian moment, of course) he will deduce from his data that he is growing old more rapidly than his friends on earth. His friends, likewise, will make their calculations, and come to the conclusion that the traveler is aging more slowly than they are. Now, if all concerned are good relativists, they will experience no qualms upon becoming aware of these results; they would realize that no conflict with experience exists, and those at home would point out that if they should ever meet the traveler again he would either be younger than, or older than, or equal in age to themselves, depending upon the exact nature of the voyage. They would also make clear that the apparent paradox which seems to be present during the period of uniform

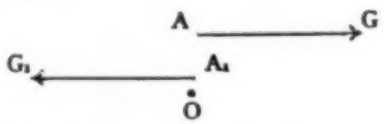
relative motion, and when the two systems are at a distance from one another, arises merely because certain notions are carried over from classical physics, unwittingly it seems, into the new demain of Relativity.

I believe, then, that the paradox of the Time Retarding Journey disappears if the basic concepts of the Special Theory, and the essence of the General Theory, as set forth above, are allowed to operate to their logical conclusion without injecting any of the old *a priori* notions into the argument.

The second apparent paradox which will be discussed here is one not nearly so widely quoted as the first, but one which is just as basic, since it involves the concept of relative velocity, upon which the Special Theory rests. W. P. Montague, who so far as I know is the only investigator to have dealt with it from a purely triadic point of view, has brought out the main points of the paradox in an engaging little fable entitled "The Land of the Mad Dictator".[12]

The essence of this problem is as follows. Consider two particles traveling with uniform velocity relatively to one another at high speed. Suppose there is an observer stationed outside the particles who is not at rest with respect to either one of them, and whose motion relative to each is uniform. Obviously, this situation is governed entirely by the laws of the Special Theory, since all three systems are inertial ones and no gravitational fields are involved.

Consider particle P moving from A to G, and particle P_1 moving from A_1 to G_1 the observer is stationed at O, and P and P_1 are coincident with O practically simultaneously. The following diagram will describe the situation:



The observer is pictured here as stationary because we shall use his system as a reference scale, although any other would do just as well.

The observer, now, measures the velocity of each of the two particles relative to his reference scale, and then proceeds to calculate the speed of P relative to P_1 from these data. He finds that P moves from A to G in the time t, and that P_1 moves from A_1 to G_1 in an equivalent period of time. All these measurements are made, of course, with his own clocks and rods. Then, being familiar with classical physics, he knows that Velocity is equal to Distance divided by Time, and so concludes that the velocity of P is given by:

$$v = AG/t$$

[12] *Phil. Rev.*, XXXIII, 143; 1924.

Similarly, he deduces that the velocity of the particle P_1 is given by:

$$v_1 = A_1G_1/t$$

He now goes a step further, and reasons: the particles recede from each other a distance GG_1, which is equal to AG plus $A_1 G_1$, in the time t. Therefore the velocity of recession of the two particles is given by:

$$W = (AG + A_1G_1)/t = v + v_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots (16)$$

This velocity of recession is taken, now, to be equal to the velocity of the two particles relative to one another.

On the other hand, if the observer is a relativist, he will use the following equation to determine the relative velocity of the two particles:

$$W = (v + v_1)/[1 + (vv_1/C^2)] \quad \ldots\ldots\ldots\ldots\ldots\ldots (17)$$

Examination of the two equations makes it apparent that the Einstein equation reduces to the classical form when the two velocities, v and v_1 are small in relation to C, the velocity of light. In such a case, the denominator of the fraction in equation (17) reduces to unity. In our situation, however, v and v_1 are large, so that the two equations will give entirely different results. We must decide, then, which of the two results we shall accept.

In order to determine the validity of one or the other of these two possibilities it is extremely important that we agree upon what is meant by the term 'relative velocity'. I shall define the relative velocity of two particles in uniform relative motion as the velocity of either one of the two particles as measured from the other, using for the measurement only the rods and clocks in the system from which the measuring is done. I think it will be admitted that any notion of relative velocity involves this basic concept, although not explicitly, since explicitness on these points was never necessary in classical physics; furthermore, I can think of no other definition which will be of any value at all heuristically, and that, after all, is the ultimate test of a definition.

To return, now, to our moving particles; suppose P is moving relative to the observer at the rate of 150,000 mi/sec. as measured by apparatus in O's system, and P_1 is moving in the opposite direction relative to O—also at the rate of 150,000 mi/sec. as measured by O. If the observer believes in the validity of equation (16), then he will conclude that the velocity of P relative to P_1 is 150,000 mi/sec. plus 150,000 mi/sec., or 300,000 mi/sec. This velocity is very much greater than the velocity of light, and as such cannot exist in Einsteinian Physics. From this the observer comes to the conclusion that the results of calculations in Relativity Physics conflict with his common sense, or immediate knowledge of the world. His analysis is based upon a triadic set-up which, he believes, is just as legitimate as the dyadic system of the Relativist.

But let us see, now, just how the observer, O, arrived at his results, and whether these results are based upon any sort of immediate knowledge. O is aware of the results of experiments conducted at low relative velocities—let us say, of the order of 0.1 mi/sec. at the most. These experiments show that when P moves relatively to O at the rate of 0.1 mi/sec., and P_1 moves relatively to O at the same rate but in the opposite direction, measuring devices on P will show P_1 moving relatively to P at 0.2 mi/sec. Similarly, measurements on P_1 will show P to be moving at an equivalent rate. The observer finds that these data are described by the analysis involved in equation (16), which is based upon the classical notion of absolute length and time. His next step is a curious one: he defines the relative velocity of the two particles as equivalent to the distance between them—as measured from a third body—divided by the time required for them to accomplish this recession—also measured from the third body. This concept becomes so deeply a part of his 'intuitive' information that he, at a later date, will consider it to be somehow a part of his direct and immediate knowledge of the world.

This procedure, of course, is highly improper, since it sets up a definition on the basis of an equation which, itself, is merely an approximation to empirical fact. It is obvious, moreover, that a definition set up on this basis is not a fundamental one, but rather a derived one.

If, now, evidence is presented which indicates that equation (17) is necessary to describe the data, and that equation (16) does not hold over a wide range of velocities, O has no right to claim equation (16) as a part of his immediate knowledge; it obviously is not, except in so far as it describes the data.

The only direct test of the validity of equation (17) is an experiment performed by Fizeau in the latter part of the nineteenth century, and later perfected by Zeemann. Although this one experiment is rather slight evidence, it is extremely significant that the results are described by equation (17) to within one percent.

It is apparent, then, that this paradox, too, vanishes when the fundamental concept of relative velocity is appreciated, and when it is realized that the triadic observer in this situation is perfectly legitimate if he only remembers that his position is entirely a derived one.

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SCIENCE AND SOCIAL GUIDANCE

THE dictum that science can not tell us what ought to be has been repeated so often that there is danger of its being accepted as a fundamental truth on a basis of mere familiarity. Its vogue is due in no small degree to the support of scientists working in the physical and biological sciences whose notions of social phenomena are naïve and unscientific. They do not even realize they are ex-

pressing a snap judgment on matters which they are not competent to discuss.

Does the dictum that science cannot tell us what ought to be rest upon scientific grounds? Will it stand up under a critical examination of the data which on scientific grounds we would expect to support it if it were true?

Perhaps no one can answer the question of what ought to be! If it is an idle and meaningless question, there is no significance in saying that science cannot answer it.

Prediction is an established function and accepted test of science. In so far as the data of science and the capacities of scientists permit, science tells us not only what is but what is going to be. So if science tells us what we are going to do, the question what we ought to do becomes quite meaningless and beside the point. However, this argument is no better than quibbling over abstract logic when according to scientific standards we should be appealing to the concrete situation of actual living.

In the concrete situation science is woefully incomplete in the information which it affords us. Willy nilly, we live in a condition of ignorance or at least incomplete knowledge about what we are going to do. Ignorance of what we are going to do drives us to ponder what we ought to do. We consider the probable results or consequences of different courses of action and set up ends or standards by which to judge their relative merits. Our answer to the question of the relation of science to ends depends upon the character of our conception of ends.

If we think of ourselves as free agents whose actions lie outside the scope of causal relations investigated by science, the ends which we set up also may be considered as lying outside the purview of science. Starting from such an assumption we may well hold that social ideals express the aspirations of members of the group and are not to be accounted for in scientific terms.

But if we think of ourselves as being within the uniformity of nature assumed by science, we come to an entirely different conclusion. According to this latter view, the ends which we set up are determined by antecedent causes and in their turn become causes helping to shape our further actions. Our consideration of ends, the formulation of principles of conduct, and the setting up of social ideals are all parts of a process of adjustment by which individuals and groups of individuals arrive at an orientation with the rest of the universe in which we all live. According to the scientific point of view, this process is assumed to be not different in fundamental character from the adjustments required for survival by lower forms of life. When we assume that the purposive actions of human beings are explainable in the objective, causal terms of science, we accept the view that teleological phenomena fall within the scope of scientific investigation. And the

more we learn about both animal sociology and human sociology, the more illuminating such an assumption becomes.

Putting the issue frankly in teleological terms, the choice between an assumption that human actions are deterministic in character, and the contrary assumption that they are not amenable to scientific explanation, will be decided upon the basis of more fundamental aims. If our purpose is to learn more about human actions, the positive assumption offers greater promise than does its contrary which closes the door of scientific inquiry. In view of the already tremendous and increasing volume of scientific investigation which is being carried on throughout western civilization, it is a serious matter to withdraw anything from the scope of scientific inquiry. That is, it is likely to be serious for the thing which is withdrawn.

If, however, our purpose be to appeal to men by a subtle and helpful flattery: to give them a better appreciation of the dignity and worth of man and thereby win them over to a good and virtuous way of life, we may decide to take the easy choice urged upon us by tradition and accept the negative assumption above stated. In doing so we would, of course, express it in positive form. And needless to say a choice made with the best of intentions might be a mistake. The best way to a good and virtuous way of life might prove to be the one which placed the greatest emphasis upon increasing our scientific knowledge of human living.

What is a good and virtuous way of life?

The above dictum tells us merely that science cannot answer this question. If we shift the issue a bit by asking whether the question can be answered, science tells us that it has been answered many times in many different ways. In fact each new generation answers it somewhat differently and from time to time in cultural history there have been periods in which peoples have radically changed the basic principles of their social organization and have given up old standards for new ones. Thereby they have very greatly altered their conceptions of the good life.

When a major social conflict arises, old notions of social organization are stubbornly and in the main honestly defended by the vested interests of the existing regime. New and disruptive ideas are advocated by members of an opposing group or groups who feel that they have been discriminated against under the old regime and in consequence they demand a new deal. The conservatives rally to the support of tested and proved principles which have become sacred through the past demonstration of their social value. The radicals base their case upon the ground that society changes and new principles are necessary to meet new conditions. Each side claims to represent the true social interest and charges its opponents with being motivated by selfish interest masquerading under false colors in reckless disregard of the common welfare.

In general it may be said that in the past society has waited for the clash of class or group interests to work out its adaptations to new conditions. This is a sad commentary upon the intelligence of the human species. It shows what a thin line separates the human struggle for survival from that of the lower animals.

When we look back upon past social conflicts, it is comparatively easy to tell who was right and why but when the conflict is in progress the choice is not so simple. It is not always easy to tell whether a would-be reformer is a hero and perhaps a martyr or merely a fool and a fanatic. For every proposal which represents an effective adjustment of society to new conditions, there are many suggestions which are grounded in the ignorance of their supporters. The man who would reform society must take the risk that his proposals may not prove to be constructive suggestions. In a period of crisis the realist who has the understanding necessary to appraise the difficulties ahead and the ability to see what will work under the given situation provides social guidance and new social ideals. The true leader is not a visionary or an idealist except in the sense that his insight is greater than that of other men.

All of this argument boils down to the proposition that social ideals are tentative adjustments in the struggle for human survival; adjustments which must be tested out in the actual process of living. They are never absolute and final and always are being revised. In terms of the work of the scientist, they are hypotheses and tentative generalizations. If we say that the scientist cannot tell us what ought to be, it is equivalent to saying that the scientist cannot formulate an hypothesis. And if it be argued that the hypothesis is not science until it is proved, we need only reply that all of the generalizations of science are tentative.

The notion that science is something apart from human life is a companion-piece to the dictum that science cannot tell us what ought to be by formulating social ideals. It is the exact opposite of the truth. The validity of science rests upon the fact that it expresses the very essence of the process of living. Living is and always has been a process of experimental adjustment. The development of scientific knowledge and the evolution of scientific techniques are parts of the great experiment.

This conception of an integration of science with human life develops out of the application of science to a study of human society. Science grows out of human living and then it illuminates for us the process out of which it has developed. The scientific interpretation pictures the life of man as a process of adjustment to the rest of the universe in which he lives. Such a process comes at the top of a scale on which are to be listed also the struggles for survival of the lower forms of life.

There is an obvious parallel between the view here expressed and

the traditional religious view that man's whole life is bound up in his reconciliation to God. In the scientific interpretation the conception of a universe in which we all live plays essentially the same rôle as that which is played by a conception of deity in traditional religion. The similarity of the two views comes from the fact that they are summary interpretations of the same thing, that is, human life. Their differences lie in their methods of summarization. One stresses the interest which we call intellectual while the other subordinates the intellectual interest to an emotional attitude; to faith and settled convictions. All that is necessary to bring them into a working agreement is a recognition that both are subordinate to the process of living and that our conceptions of the universe and of God are equally and highly tentative.

For better or worse we are committed to the problem of finding out more about the process of living and about everything that is associated with that process. Interpretations of science and religion which divorce them from the process by assuming that they are superior to it or independent of it are bound to be sterile. A stiff-necked scientist is no better than a stiff-necked priest, and *vice versa*.

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JOHN WILKINS—A PRECURSOR OF LOCKE

IN THE examination of Philosophicall [scientific] points", wrote Bishop John Wilkins in 1640, "it were a preposterous course to begin at the testimony and opinion of others, and then afterwards to descend unto the reasons that may bee drawne from the Nature and Essence of the things themselves".[1] Of similar vein is his subsequent statement that the science of Astronomy "far exceeds all those barren, empty speculations, about *Materia prima*, and *Vniversale*, and such like cob webs of learning; in the study of which, so many doe misplace their younger yeares". The science is particularly desirable, he held, because "the *demonstrations* of *Astronomy* . . . are as infallible as truth itself".[2]

In this emphasis upon the validity of sensory observation and upon the combination of such observation and the reasons which may be drawn from it as the proper basis of truth or knowledge, Bishop Wilkins implies what Locke said later regarding "human understanding"—the "great source of most of the ideas we have" is sensation, or the information brought to the mind by the senses. Sensation or perception is in fact the primary basis of all ideas, for, said Locke, "To ask, at what time a man has first any ideas, is to

[1] *That the Earth may be a Planet, London*, 1640, p. 2.
[2] *Ibid.*, 236-37.

ask when he begins to perceive; having ideas, and perception, being the same thing."[3] That this is the concept in the mind of the Bishop is, I believe, a certainty, for in another place he states, even more succinctly than Locke himself, the basic thesis of the *Essay Concerning Human Understanding:* "Our understandings" are "capable only of such things as have entered by our senses, or else such mixed natures as may bee composed from them".[4]

It is not suggested that Bishop Wilkins was the source of the thesis which Locke announced half a century later. Both men breathed the same air, and were closely identified with the English scientific renaissance of the seventeenth century. The Bishop was one of the two first secretaries of the Royal Society, perhaps more than any other man its founder, and an ardent apostle of science and the scientific method. His theory of knowledge was uttered in defense of the "new philosophy" and presumably was affected by it. An equally important stimulus was his reflection upon the limitations of human understanding, specifically occasioned by the question of our ability to know the nature of "those creatures" which inhabit other worlds. Locke was likewise a member of the Royal Society, and held in profound veneration such contemporaries as Boyle, Huygens and Newton, for whom he was content "to be employed as an under-labourer in clearing the ground a little".[5] It was in part the spectacle of "the busy mind of man . . . meddling with things exceeding its comprehension" which brought forth his theory of human knowledge.[6] There can be no comparison between the relative importance of Wilkins and Locke in spreading the conception that "all ideas come from sensation and reflection", for the conclusion of the Bishop was a passing comment, left lying where it fell. Nevertheless, Bishop Wilkins gave prior expression to the conception, and did much to preserve and foster the climate of ideas from which Locke, like himself, in some measure developed this interpretation of "human understanding". He was not an unworthy precursor of England's best known epistemologist.

GRANT MCCOLLEY

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[3] *Essay*, II, i, iii, ix.
[4] *The Discovery of a new World, London*, 1640, p. 190. This edition of the *Discovery* is bound with the 1640 edition of *That the Earth may be a Planet.* It of course had been a principle of the schoolmen that there were no ideas in the mind which had not entered through sensation, but the principle had been neglected far more than it had been employed.
[5] *Op. cit.*, "The Epistle to the Reader".
[6] *Ibid.*, I, i, iv.

REVIEWS OF BOOKS

Philosophy and History. Essays Presented to Ernst Cassirer. Edited by RAYMOND KLIBANSKY and H. J. PATON. Oxford, at the Clarendon Press, 1936. Pp. xii, 360.

This volume contains twenty-one essays, by distinguished scholars in England and in western continental Europe, published in honor of Dr. Ernst Cassirer on the occasion of his sixtieth birthday. It contains also a bibliography of Dr. Cassirer's writings. The title of the book indicates, as well as is possible, the nature of its subject-matter. The distinguished services of Dr. Cassirer to both these branches of learning and their intimate union in his own thought make the relationship between history and philosophy the only appropriate subject for the volume. Unhappily, the subject is not only very inclusive but also very vague, and it involves issues that are at once controversial and ill-defined. In consequence, the essays, though they all fall properly within the general subject of the volume, are extremely various and are often quite incompatible with one another in their systematic implications.

The volume would have justified its existence if it did no more than express the honor in which Dr. Cassirer's name is held by the whole world of free scholarship. Many of the essays are significant contributions to the specific subjects which their authors have chosen. Possibly the greatest utility to be expected from such a volume in English-speaking countries is that it should call attention to a phase of philosophical interest which has been relatively neglected, as compared with the attention given to it where Dilthey has been more carefully studied. The volume has the merit also of giving a kind of conspectus of scholarly opinion on matters relating to the metaphysics and epistemology of history. Notwithstanding these substantial values, however, the present reviewer is unable to see that the volume exhibits any tendency to come to an agreement on the main outlines of the subject, or even to agree upon the locus and the definition of its chief problems. Perhaps this is too much to expect, since the subject is of such breadth and importance that it is vitally affected by every systematic difference between philosophical points of view.

For evident reasons the most important question involved in either the epistemology or the metaphysics of history is the nature of time, and this question recurs again and again in the essays. The treatments of time, in their most general aspects, vary from those controlled by Hegelian idealism, in which it is necessary to argue away the appearance that history is a surd and to show how it may be "reduced to the instantaneous or timeless act of thought" (104), to those which acclaim history because it obliges philosophy to "keep constantly in mind the timefulness of things" (12). Perhaps it is significant that He-

gelianism has now apparently retired to Italy, since the editors have not thought it necessary to include a sample of its chief variant, Marxism. The volume contains two essays on that favorite Hegelian theme, the identity of history and philosophy, one by G. Calogero of Pisa specifically discussing the subject and one by G. Gentile on "The Transcending of Time in History". The latter rehearses the traditional arguments with that reckless exploitation of paradox which characterizes this philosophy at its worst. "Historical fact is not presupposed by history" (95). "The past is the character of an object still affirmed in an abstract way by a thought naïvely unconscious of itself" (97). "The temporal character of history is an unreal one." "Facts in their multiplicity, particularity, and chronological order, are absolutely non-existent and as irrational and unintelligible as the so-called phenomena of nature" (99). "The facts recorded are identical with the recording of them" (104).

Since this treatment of time is alleged to follow from the nature of intelligibility, Gentile's essay is appropriately followed by Miss Stebbing's on "Some Ambiguities in Discussions Concerning Time". This essay refers in the main to McTaggart's arguments to show the unreality of time, but these are substantially identical with the arguments used by Gentile and are much more cogently developed. The conclusion which Miss Stebbing reaches—and the only position, one would think, that a logician could rationally adopt—is that any paradox, about time or anything else, must arise from a confusion of standpoints. If this is so, it seems to follow that any philosophy which claims the validity of logic must be such as to admit a variety of standpoints and also to permit their conciliation without arguing any one of them out of existence.

Apart from the Italian contributions, the tendency appears to be to regard Hegelianism as a part of what Bréhier calls the "smoke of Romanticism" (169) and therefore a thing of the past. This is partly because of what F. Gundolf, in an essay on "Historiography", describes as the "naïve arrogance" (280) with which Hegel treated the experimental sciences, but mainly and more importantly because the idealist treatment of time is radically incompatible with what Alexander terms "The Historicity of Things". "The real world is made of particulars", and "universals are but the patterns of their behavior". "A universal is an arrangeability in events" (12). L. Brunschvicg, in an essay on "History and Philosophy", refers to the philosophy of history (meaning chiefly Hegel and Comte) as "the darling vice of the nineteenth century" (30), "the legatee of the old apologetic" (31), having its origin in what Bergson has called the "fabulatory function", and culminating in the "myth" of Georges Sorel. Bréhier, in an admirable essay on the rise of the present-day historiography of philosophy, dates

it from Renouvier's attack on the confounding of contradiction and contrariety in Hegel and on the dogma of progress in Comte (169). "Hegel and Comte exclude from history whatever did not humour their philosophical Messianism" (170).

Brunschvicg apparently believes that there has been a *rapprochement* between history and science, because the latter has fully accepted the intelligibility of irreversible process, to be scientifically dealt with by the calculation of probabilities (32). On historical grounds Bréhier stresses the fact that scientific rationalism—though traditionally Cartesianism had, as Lévy-Bruhl points out, a low opinion of historical knowledge—produced the first approximation to the ideals of textual and factual accuracy. In view of the long established contrast between *Naturwissenschaft* and *Geisteswissenschaft*, it is interesting to find Edgar Wind choosing as his subject, "Some Points of Contact between History and Natural Science". He shows easily enough that the extraction of historical truth from a document and of scientific truth from an experiment are in principle pretty much alike. The reviewer wishes that Dr. Wind had been more defiant and had not felt obliged to defend his essay prospectively against the charge of being "symptomatic of a sinful relapse into the method of thought so generously abused as 'positivistic'" (256). A reasonable amount of scientific positivism would be good for all epistemologists of history.

In the main, however, the epistemological tradition arising from Dilthey and descending through Windelband and Rickert is the tendency most frequently represented by the essays in the volume. This "critique of historical reason", as Dr. Klibansky calls it (329), has come to have almost as many and as varied forms as the critique of scientific reason. Theodor Litt, in an essay on "The Universal in the Structure of Historical Knowledge", finds the difference between the two kinds of science in a contrast of the classificatory universal with an "intuitable generalization". This is appropriate to the "spiritual world" and is at least mildly reminiscent of Hegel's concrete universal (132 f.). Fritz Medicus defines the contrast as a difference between two kinds and degrees of objectivity; unlike science, history is "a knowing in which there is no object independent of the subject" (137). In this form the contrast involves the author in a desperate effort to save the historian's intellectual honor and also overlooks the kind of similarity between historical and scientific procedure indicated by Dr. Wind.

The most effective presentation of this type of epistemological dualism in the volume is that by Raymond Klibansky in his essay on "The Philosophic Character of History", though even here the solution is not convincing unless one is willing to presume a generally Kantian point of view. Dr. Klibansky begins with an effective criticism

of the idealist antithesis between mind and nature, but he at once accepts "two fundamental aspects of our understanding" (327), that of number and that of image, *quantum* and *quale*. The development of the first issues in the transformation of all essence into relation, as Cassirer has shown. The development of the second leads to the imaginative orientation of fact toward a significant image. The essay is filled with illuminating remarks, but to the reviewer the general position is unconvincing. The assumption that all the understandable patterns of events reduce neatly to two seems unduly violent and moreover Alexander has at least a *prima facie* case when he asserts that the patterns are in the events, not in the understanding.

Quite different from these sober attempts at an analysis of historical knowledge, but still claiming an affinity with Dilthey, is Ortega y Gasset's essay on "History as a System". This reads rather like a preachment by Fichte, composed with the rhetoric of Bergson. In the present crisis of European culture the author longs for a new moral revelation, which he proposes to validate by saddling it in some fashion on history. "Physical science can throw no clear light on the human element. . . . This means simply that we must shake ourselves free, radically free, from the physical, the natural, approach to the human element" (293). "Man has no nature"; his life is "a pure and universal happening" (303). Both Nature and Spirit (*Geist*) are equally "Eleatic". "The time has come for the seed sown by Heraclitus to bring forth its mighty harvest" (305). At the same time, "there is no question of granting a licence to irrationalism" (321). This, surely, is a new romanticism to replace that which Bréhier and Brunschvicg suppose to be happily dead. To the service of what "philosophical Messianism" will this "original, autochthonous reason" be put?

The volume contains several essays in addition to those mentioned which would well repay description and discussion, if space permitted. A review ought certainly to allude to several excellent historical studies which the book includes. Of these the most interesting and the most remarkable are two in the general field of modern iconography. In one F. Saxl traces the symbol "Veritas filia temporis" from its adoption by Aretino in the sixteenth century, through its various uses in the religious controversies of the Reformation, its adaptation to the political successes of Richelieu, and its final appearance as a symbol of scientific truth embodied in Descartes and Newton. The other essay, by Erwin Panofsky, traces the transformation in the meaning attached to the tag, "Et in Arcadia ego". These two essays are illuminating studies in the evolution of symbolism and of the relationships between symbols and philosophic moods.

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On the Contented Life. By EDGAR A. SINGER, JR. New York, Henry Holt and Company, 1936. Pp. x, 272.

The essays included in this volume, all of which have appeared previously in various journals, have been here collected because of their unity of theme, aptly expressed in the title. In a foreword the author tells us that their publication here is shortly to be followed by two other volumes, *Modern Thinkers and Dialectic of the Schools*, and *The Experimentalist*. But without such information no reader of these essays could fail to realize that the unity of thought which pervades them must have a wider systematic setting, nor fail to look forward with eager anticipation to the fuller setting forth of that system.

There are philosophic writings, which from the first paragraph challenge the reader, awaken the critic in him, and put him on the defensive. Some of Professor Singer's earlier writings are of this sort, as is attested by the famous controversy they once aroused. But the writings of this volume belong to a different genus. Not that they have less of matter in them to awaken thought, or even to stir controversy, but that the reader is rather constrained to meditate with the writer, and to follow him along the difficult path and into the byways of his thinking. It is the sage, rather than the skilful dialectician, who writes of the contented life, and if the art of dialectic is used, it is supplemented by a wealth of erudition and subordinated to the insights of a deeper understanding. No review, however brief, can omit some mention of the style of writing, so characteristic of the work. Not only has the *mot juste* been sought and found, but each sentence has been fastidiously and highly wrought, and the whole freighted with a wealth of rich allusion. The reader is at times distracted from the matter of the thought by the manner of its presentation; one who might hold the excellence of philosophic style to be measured by its unobtrusiveness would not find his ideal realized here.

Despite all differences, there is an underlying community connecting Professor Singer's thought with that of his two great contemporaries, Professor Whitehead and Professor Dewey. Becoming is integral to being. Reality must be such as to include the attainment of ends, but such that the attainment of no end can be final. It is in the light of this conviction that Professor Singer would determine the conditions of the contented life. The necessary, but not sufficient, condition of contentment he finds to lie in the pursuit of an intrinsically unattainable end—an ideal end, toward which we may progressively approach as to a mathematical limit. Such progress is measured "by the measure of man's co-operation with man in the conquest of nature", and to this progress the scientist, the moralist, and the artist are essential contributors. The contented life cannot, however, be lived without love—the love of God as identified with the ideal Goal, and the love

of one's fellow men as irreplaceable individuals. Only in the union of these two loves may the eternal and the ephemeral be united. But to see how "the whole conception of goodness melts into that of progress", and how not only love and loyalty, but the ineffable experience of beauty, are essential to the rational ideal, the reader must be referred to the essays themselves. If he is like this reader, he will not find all his questions answered, but he will have found his own thought quickened and deepened, and what more can one ask?

GRACE A. DE LAGUNA

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La jeunesse d'Auguste Comte et la formation du positivisme. Par HENRI GOUHIER. Paris, J. Vrin, 1936. Pp. viii, 338.

The study that Gouhier is devoting to the youth of Comte and the formation of Positivism is conceived on a vast scale. It is far more than the story of a man and of a doctrine; it is in addition the analysis of an age, and of the total conditions within which the youth becomes a man and Positivism the precipitate of the conditions. The present volume, the second, in the series, is to be followed by a third, with the sub-title, "Auguste Comte et Saint-Simon". The re-appearance of Comte in Gouhier's drama is then postponed to the third volume.

In a comprehensive sense, then, this second volume is preparatory for the third. But in itself it constitutes a remarkably illuminating study of the so-called father of Socialism. This title is indeed misleading. Gouhier asserts that the Saint-Simonians, and not Saint-Simon, made Saint-Simonism, and that it can scarcely be said that Saint-Simon made the Saint-Simonians. The author, recalling the estimate that Mme. de Stael gave of Rousseau—"he has discovered nothing, but he has inflamed everything"—says that it would apply more properly to Saint-Simon than to Rousseau. "Saint-Simon is the man whose internal dynamism created about him a zone of vibrant thought. The ideas that dance in his head are pre-positivistic themes. The heat which rendered them radiant is revolutionary hope. The first fifty-five years of his life reveal both this assemblage of ideas and the energy which transformed them into idea-forces. The assemblage never ceased to be a *bouillonnement* but the energy persists, and it is as a professor of energy that Saint-Simon entered the nineteenth century." This conveys the interpretative standpoint adopted by Gouhier, and, one anticipates, will determine his story of the association of Comte and Saint-Simon.

Revolutionary energy and hope, rather than revolutionary ideas, was the contribution of Saint-Simon. The energy and hope, indeed, together with the often fantastic play of the collection of ideas, were constrained by traditional forms. The revolutionary spirit found expression in what appears to be proposals for reconstruction within the

forms of traditional institutions rather than the replacement of traditional institutions by new ones. Gouhier signalizes this by a fly-leaf quotation from Saint-Simon. "The establishment of the clergy and of the nobility is an organic result of the human species. . . . The clergy and nobility should be recomposed, reorganized, reconstituted, when the individuals who compose them do not possess qualities eminently distinguished and evidently superior. A good reorganization of the clergy and nobility can be effected only by a genius of the first order." The man of revolutionary energy, curiously enough, was confronted by the Restoration; "in a world in which the King has returned, saluted by two hereditary orders of nobility, in a society in which the Church has regained its authority, Saint-Simon transmits the promise of the true Revolution". Saint-Simon, become the "inhabitant of Geneva", belongs to the history of philosophy, concludes Gouhier, because there was a Positivism of Auguste Comte and a Saint-Simonism of the Saint-Simonians—but neither this Positivism nor this Saint-Simonism would have come into being had there not been a man for whom the Revolution remained actual. With this we have the cue for the re-entrance of Comte upon the scene.

ALBERT G. A. BALZ

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Causation, Freedom, and Determinism. By MORTIMER TAUBE. London, George Allen & Unwin, Ltd., 1936. Pp. 264.

After surveying the meanings of causation and freedom in some seventeenth century philosophers and in Hume, who is charged with being ignorant or mistaken concerning these meanings, Dr. Taube postulates in his own analysis of the terms: (1) Introspection or intuition is a valid source of knowledge, say of causation and of one's own freedom (7, 8, 223, 229). (2) Introspection reveals "an indubitable experience of the causal relation of events" (155). From these two assumptions it follows that some but not all cases of causal influence and freedom are indubitably experienced. Yet while such reasoning is valid, the premises are highly questionable. The arguments which make introspection highly questionable as a valid source of knowledge are to be found in Peirce's essay, "Questions concerning Certain Faculties Claimed for Man" (*Journal of Speculative Philosophy*, 1868, II, 103-114, reprinted in *Collected Works of Peirce*, V, 135-155). The arguments against the causal relation as an "indubitable experience" are found in Hume and his positivistic successors. It is also improbable that Hume was ignorant of the seventeenth century meanings of causality as an efficacious relation, since he cites Locke's, Hobbes's, and Malebranche's views on causation in the *Treatise* (Bk. I, Pt. III, sec. xiv) quite fairly before he proceeds to attack them.

Moreover, it is difficult from an historical standpoint to agree with Dr. Taube's insistent claim that Hume confused causation with determinism in his attack on the idea of necessary connexion. Surely most seventeenth century thinkers regarded efficient causation in nature as altogether in harmony with and ultimately dependent upon a necessary and universal determinism in the order of nature. Hence any attack on the idea of necessary connexion would be implicitly an attack on the validity of causal inferences as conceived in mechanical science up to Hume. The chief historical question here is how adequately Hume's arguments express the transition from the formulation of causality in mechanical terms to its status in modern science. I believe that Hume perceived the logical difficulties in the classical view of causation without having enough mathematical ability to formulate a more scientifically adequate account of the probability-relations empirically encountered. Dr. Taube is certainly correct in criticizing Hume's psychologism, which rendered the logical relation of necessity into a belief. Such confusions are probably responsible for Dr. Taube's contradictory assertions about Hume's view of causation: "Hume uses the term 'causation'; but he does not use it to describe some observed relationship but as involving the possibility of inference" (138). "The causal inference, then, must be based on experience" (143). "Hume himself must be understood as testifying to the direct perception of causal efficacy" (157).

Dr. Taube has forcefully shown the shifts and ambiguities in the meaning of causation among seventeenth century thinkers and in Hume himself. He has also rightly insisted on distinguishing the empirical from the logical elements in causal inferences. But he has not shown whether these elements, once distinguished, form a clear and coherent meaning. For his own definition of cause is given in very loose terms: "An event A causes an event B, when B results partly from some activity or influence originating in A" (17). The terms "results partly from", "activity", "influence", "originating in" are either vague or question-begging, and surely unsatisfactory for scientific purposes.

A certain very admirable moral aim seems to direct Dr. Taube's analyses of causation, determinism, and freedom. "The chief significance of this work lies in its proof that everything occurring in the world is ultimately the result of the activity of free agents. . . . If scientific determinism is discarded and along with it the naïve picture of an initial 'push' from which all things 'follow regularly', every *res vera* can be understood as a free agent, as an active factor in the world process" (flap of cover). But moral aims have very little to do with the revision of *classical* determinism by modern science, and the rejection of *mechanistic* causation does not imply the abolition of scientific determinism.

Since Leibniz believed in both scientific determinism and free agents, Dr. Taube properly devotes a good many pages to the logical difficulties of Leibniz' metaphysics, which might have been more profitably devoted to Leibniz' logic, the source of most of Leibniz' difficulties as well as contributions. Leibniz' recourse to the pre-established harmony, which reconciled the contingent actions of efficient causes with the necessity of divine decree and purpose, obscured his attempt to furnish a rigorous logic for physics. The further intrusion of theological interests in seventeenth century scientific logic shows itself in the refusal of Locke, Newton, Descartes, Spinoza, and Leibniz to impute the power of initiating motion to matter itself devoid of spirit.

Dr. Taube's provocative discussion of historical doctrines is marred mainly by inadequate logical expression of his own views. For example, note the vagueness of the term "experience" in his program for the philosophy of science. "There are two things which metaphysics or a concern with concrete fact asks of the natural sciences: (1) that the abstractions used by the natural sciences be capable of being derived from actual experience; and (2) that the conclusions of science have meanings in terms of such experience" (232).

PHILIP PAUL WIENER

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Beyond Humanism. By CHARLES HARTSHORNE. Chicago, Willett, Clarke & Company, 1937. Pp. xiv, 324.

This book is a plea for what Professor Hartshorne believes to be "the twentieth century's supreme theoretical discovery—theistic naturalism" (56). "All philosophizing is clear and consistent only in so far as it is explicitly and persistently theistic" (86-87). All real entities are organic individuals, individuals within individuals, culminating in God, to whom we owe the perfect love of a naturalistic religion. Nature is psychic: "Only the psychic or at least quasi-psychic interpretation of nature throws any light upon the reality of patterns or laws" (121). Why do electrons jump orbits? They get bored!

Professor Hartshorne describes in detail the difficulties involved in modern materialism and determinism. Here, if anywhere, is the value of the book. But his language is arrogant and extreme. Bertrand Russell is "prejudiced", "has not kept up with the march of ideas", "his reasoning fails to be cogent", "his information is inadequate"; Santayana contains "basic incoherencies", his *matter* is "completely unintelligible", he is a "medieval Aristotelian without . . . the semblance of intelligibility" possessed by the medievals, his case is "hopeless"; the *pure motion* of Alexander is absolutely "unimaginable" and "contradictory"; Croce preaches a "painfully outgrown" Berkeleyan idealism; Heidegger "is as plainly inadequate". There is a fine chapter

on the strength and weakness of positivism, fair and well balanced, but even with them "if you scratch an anti-metaphysician you find an antiquated metaphysician underneath" (288).

But judge the spirit of this book for yourself. This for Russell: "One could give a long list of important original thinkers . . . who have rejected determinism. Peirce, James, Dewey, Russell, Varisco, Bergson, Whitehead may serve as examples. Some philosophers, among them Russell, regard the issue as incapable of definite solution. [!] But Russell . . . exhibits not the slightest knowledge of the principal reasons which have led to their conclusion the thinkers mentioned above. And this ignorance is characteristic of the deterministic writers who are still to be found" (128). And this for Santayana: ". . . The men who have created the details and the outlines of our accurate knowledge of the physical world have in scarcely a single case looked upon the material world as the soulless, inexplicable mass of changing stuff Sanatayana describes it as being" (237). Professor Hartshorne hides behind the skirts of his favorites and sticks his tongue out at the rest.

"Humanism" is apparently another name for the devil. On the first page of the book it is "the expression of an interest in man", but before many pages it has become identified with naturalism in its most materialistic and deterministic forms, and it ends by being charged with responsibility for every evil from fascist brutalities to premarital intercourse! Is humanism inevitably atheistic? Does humanism reduce man to an insignificant atom in the whirlwind of the blind forces of nature? Many humanists will get quite a surprise to discover themselves agents in the disintegration of contemporary civilization.

"Today there is a philosophical movement which is not idealism, or monism or materialism or sheer pluralism or positivism or supernaturalism or atheism, or any of the older *isms*, but a genuine integration of all the modern motifs . . ." (viii). Your reviewer can find nothing here that is newer than, or as good as, Leibniz. And he remains entirely unconvinced that theistic naturalism is the twentieth century philosophy, the most important step in thinking since the Middle Ages.

ROGER W. HOLMES

MOUNT HOLYOKE COLLEGE

Being and Being Known. An Introductory to Epistemology and Metaphysics. By WILLIAM CURTIS SWABEY. New York, The Dial Press, Inc., 1937. Pp. xviii, 318.

This book has a twofold aim. On the one hand it claims to be, as the subtitle indicates, a general introduction to epistemology and metaphysics. In accordance with this claim it contains reasonably elementary discussions of such problems as the nature of perception, the

nature of knowledge, space, time, causation, substance, mind-body, and freedom. If the continuity of the chapter titles is not always clear and the change of subject-matter often somewhat abrupt, justification can be made in terms of the acknowledged aim of the book; presumably the deeper problems of integration and consistency do not arise at the elementary level. Criticism of historical theories occupies the bulk of the presentation, and frequently leaves the reader in some doubt as to what the author's positive contribution to the problem is. In all cases, however, the exposition of alternative theories is fair, and the criticisms pertinent, sharp, and lucid.

On the other hand the book claims to be, as Professor Swabey makes clear in his preface, the expression of *a* philosophy. In accordance with this claim the subtitle might well have been, "Outlines of an Eclectic Commonsenseism". This thread which purports to run through the discussion and to give it the necessary unity is often rather tenuous, and there is some justification for the impression that the book is only a series of more or less disconnected essays on various topics of epistemology and metaphysics, each interesting in its own way. Certainly Professor Swabey has not presented us with a philosophy which is either original or fullblown. But he has made a strong plea, in an age when positivisms, phenomenalisms, and operationalisms make special pleading necessary, for a return to a realistic theory of perception, and to a substantialist theory of nature.

In opposition to both new realism and subjectivism, Professor Swabey finds himself in essential agreement with the critical realists. By inserting the intentional object into the perceptual act, he argues, there is brought about the desired reconciliation of a monistic theory of perception which alone makes truth possible and a dualistic theory which alone makes error possible. The intentional object, the ***what*** of the object, is given immediately and directly; but the existential object, the physical object, is given only inferentially. Ideas are definable as whatever is the object of understanding when a man thinks, *i.e.*, whatever is the object of an intentional act. Hence there is much to be said for the Platonic theory of ideas as eternal and self-subsistent entities, and all pragmatisms and relativisms are definitely rejected.

In a similar vein the author argues against operationalism. The main error of this method, he insists, lies in its arbitrary exaltation of the method of study over the material studied. It persuades us to accept makeshift and temporary definitions as substitutes for real analyses of meanings. On the grounds of operationalism, for example, we are obliged to regard intelligence tests as true measures of some trait which must then be called "intelligence" in spite of the fantastic and inappropriate character of the tests proposed. No one means by "intelligence" simply that which is measured by intelligence tests. Similar

objections apply to all operational definitions. Better an agnosticism and a probablism than the acceptance of an operational conception of meaning.

Throughout the discussion Professor Swabey endeavors to justify his fundamental thesis that *being* precedes and is the basis of *being known*. This attempt eventuates, in opposition to all phenomenalisms, in a theory of real infinity, causality, substance, and self. He insists, for example, that there is an objective principle of lawfulness in nature which is not reducible to predictability but is precisely the ground of this predictability. Similarly, he argues that the identity of the self is the ground of the awareness of personal identity. "The fact is that I can only *know* that I am the same as the person who had such and such an experience or did such and such a thing, if in fact I *am* that person" (241).

In all of this, of course, there is implied a technique of inference and a criterion of verifiability. If *being* is the condition of *being known*, then what is known of a thing need not be exhaustive of its nature; hence the positivistic criterion of verifiability is rejected. The author unfortunately does not state what alternative test he is employing. Obscure and incomprehensible ideas need not be rejected, for unintelligibility is not necessarily indicative of unreality (168). Consequently he boldly concludes that the world is objectively infinite, since infinity means merely limitlessness and there is no absurdity in limitlessness as such (170). Inference may be made to an objective causality even though "obscurity to the intellect" is one of the "genuine features of causation". In the face of this one wonders why any theory of being should be preferred to any other, since all such theories must start with what is known, and no such theory can be rejected on the basis of its incomprehensibility or obscurity. There is just the suggestion that the author has made up his mind in advance that philosophical arguments are finally unpersuasive as over against a commonsense outlook. Nevertheless, it is refreshing occasionally to have this point of view actively and vigorously defended, if only to weaken the complacency of an over confident positivism.

A. Cornelius Benjamin

University of Chicago

Nachgelassene Schriften. Von Johann Gottlieb Fichte. II. Band: Schriften aus den Jahren 1790-1800. Herausgegeben von Hans Jacob. Berlin, Junker und Dünnhaupt, 1937. Pp. xlvi, 614.

The commencement of this work explains that this is the first volume of Fichte's posthumous works to be published: as the works still to be published are earlier in date of composition, this is designated the second volume. This volume contains two documents: the first is

Vorlesungen über Logik und Metaphysik, which occupies 341 pages; the second *Wissenschaftslehre,* extending to 273 pages. The editor provides an introduction, which supplies interesting accounts of the documents, explaining their origin, character, and importance. Both these writings throw light on the development of Fichte's teaching and philosophical convictions. The *Vorlesungen* were designed to be "a kind of introduction to the transcendental philosophy" according to Fichte's statement in 1794 (xi). The method adopted was to expound Platner's aphorisms, as these seemed to Fichte peculiarly well suited to provide definite statements on which further exposition could be based. This text for the lectures was chosen by Fichte because he did not accept the author's views (xiv), a procedure which enabled him to emphasize points of difference: at the same time Platner was chosen because of a certain tendency to what among German writers of that period was called the pragmatic and anthropological standpoint. Fichte not only used Platner as a convenient text but apparently derived some inspiration from that source: for this reason the lectures reproduced in this volume have some significance for anyone who wishes to trace the development of Fichte's thought.

The second document presented in this volume has the simple title *Wissenschaftslehre,* in contrast with the titles used in previous years for this course of lectures, such as "Begriff der Wissenschaftslehre". The significance of this, according to the editor's explanation, lies in the fact that Fichte was discovering a new method (*nova methodo* appears in the announcement of the course for 1796-97) and was making a transition from the standpoint of criticism to metaphysics. In other words, the characteristic doctrine of Fichte was emerging, the affirmation of consciousness as the basis of all theories of experience was becoming explicit, and the distinction of theoretical and practical doctrines was on the way to being obliterated in the primal unity of the Act. A note prefixed to the manuscript and reproduced on page 343 shows that this change of direction was fully recognized: the new method is described as the opposite of the method used in 1794 and is marked by the intention of beginning from the practical as being the more natural procedure and more in harmony with the real development of consciousness in general.

These remarks will indicate the usefulness of this volume for those who may undertake at any future time the task of tracing in minute detail the growth of Fichte's philosophy. The sources are manuscripts found in Berlin and Halle respectively. It is of some interest to learn that the first manuscript is in two distinguishable parts and that the first part can "undoubtedly" be ascribed to K. C. F. Krause, who at this time expressed enthusiastic admiration for Fichte (xvii). The history of the second manuscript can be traced in part but the writer

is not identified. This volume as a whole is excellently produced and, so far as can be judged without reference to the original manuscripts, is carefully and critically edited.

G. S. BRETT

UNIVERSITY OF TORONTO

Business Ethics. Studies in Fair Competition. By FRANK CHAPMAN SHARP and PHILIP G. FOX. Century Studies in Economics. New York, D. Appleton-Century Company, 1937. Pp. xii, 316.

As the fruit of almost a quarter of a century of teaching business ethics by the case method at the University of Wisconsin, this book will be welcomed by those instructors who have likewise learned from experience the advantages of the inductive approach to questions of morality. With a minimum of exhortation the authors explore "the right and wrong of the transactions that take place in the competitive business world . . . what the honorable business man will do and will refuse to do from moral considerations". But they confine themselves, with partially disastrous results, to "a small group of intimately related problems", namely the buyer-and-seller issues of fair service, fair treatment of competitors, and fair price. Little is said about the problems of monopoly or those of labor. This is unfortunate, although no book can be blamed for not including everything, because it is just the problems of monopoly and those of labor which bring out most clearly the ethical weaknesses of the sort of "business efficiency" criteria that the authors employ.

A paragraph heading asks the question: "Does Our Competitive System Make Fair Dealing Impossible?" to which the answer is that "The basis of business survival should be economic efficiency, and competitive activities . . . afford an automatic device for determining who are the efficient. Thus . . . the competitive system is fundamentally constructive." The authors go on to show in detail how competition by being "fair" can carry on this beneficent work; but actually they succeed in piling up a mountain of evidence that the profit-seeking motive is eternally stepping over the bounds they would like to see it set for itself. Occasionally they argue that moderation in the pursuit of gain is "not merely good ethics, it is good business". But in monopolies and in labor relations it has often been poor business by merely economic standards. In those fields the quest for efficiency quickly becomes ruthless in terms of other human values; and there is much evidence of the working of a sort of Gresham's Law in business ethics (as in international politics), whereby shady practices drive out the honest, in the short run at least. Taking the present economic order pretty much for granted, the authors have performed the useful task of showing how a business man can be somewhat more moral than he is at

present (and much more so than the laws require him to be); but largely at his own expense, which makes morality a luxury after the cynical formula—"Get on; get honor; get honest." What moralist will undertake the harder task of carrying the inductive quest a step further, and inquiring how competition can be not only fair, but humane as well?

HAROLD A. LARRABEE

UNION COLLEGE

DESCRIPTIVE NOTICES

An Introduction to the Philosophy of Science. By A. Cornelius Benjamin. New York, The Macmillan Company, 1937. Pp. xvi, 470.

Professor Benjamin evidently considers that the proper business of an "Introduction" such as this is to state typical problems rather than to offer even a tentative or general solution of them. Accordingly, of the three Parts into which his book is divided the first is entitled "Problems in the Logic of Science", the second, "Problems in the Analysis of the Concepts of Science", and the third, "Speculative Problems". The study as a whole is limited mainly to the domain of the mathematical and physical sciences. Within this domain Benjamin finds four interrelated factors, namely, the knower, the known, the knowing, and the knowledge. Ignoring the first as irrelevant to the above problems, and provisionally characterizing the second as a complex of events, scientific knowledge may then be defined as "the awareness of events", including in that awareness acquaintance with a realm of events, awareness of a system of symbols referring to that realm, and "awareness that the realm of events referred to by the system of symbols is precisely that given in direct awareness" (55). After a preliminary discussion of the nature of symbols and the process of perception, the author goes on in Part I to distinguish the descriptive and explanatory stages of scientific knowledge, and to outline the techniques associated with each and with scientific discovery. A special chapter (VIII) briefly considers six different theories of the aims of science, namely, empiricism, operationalism, constructionalism, conventionalism, logical positivism, and scientific realism. Then in Part II the empirical foundations, scientific content, and operational derivation of such basic concepts as those of order, number and quantity, space and time, motion force and matter, and law and cause, are specified. And finally, Part III takes up three speculative problems arising from the scientific situation, namely, the problem of the classification of the sciences, the problem of human freedom, and the problem of the nature of reality. A bibliography of relevant works in English is appended to each chapter.

H. R. Smart

Cornell University

Die Welt als Fühlen. Eine naturphilosophische Studie für Fachleute und Laien. Von Eduard Konrad Zirm. Leipzig und Wien, Franz Deuticke, 1937. Pp. xii, 282.

Zirm's work is a bold and ingenious idealistic-positivistic attempt of making feeling the metaphysical key to all aspects of man's existence and destiny, knowledge and error. A positivistic theory of feeling serves as a basis for a system of nature-philosophy. It is a frank avowal of an empirically oriented romanticism and mysticism. The author studiously and provocatively castigates the long-standing over-estimation of intellect and consciousness against an ignorant under-estimation of feeling. Zirm's metaphysic of feeling is anything but a vague, nebulous, and giddy sentimentalism. It candidly opposes the cold and wooden rationalism of sheer material-

istic enlightenment. Its popular style does not in the least impair the thoroughness of its scholarship nor the wealth of its points of view.

HERMAN HAUSHEER

LAMONI, IOWA

La conscience et le corps. Par R. RUYER. Paris, Félix Alcan, 1937. Pp. iv, 144.

Considering parallelism as more nearly a postulate than a doctrine, five attempts at a solution of the problem of the relation of mind and body are considered. They are (1) epiphenomenalism; (2) dualistic spiritualism, which makes body the agent of the mind, yet real; (3) neutral monism, a thesis very popular today, but which harks back very definitely to Berkeley; (4) critical idealism, related to monism, but insisting upon epistemological dualism; (5) the contrary of epiphenomenalism. The subjective alone (Ruyer does not say sensations) are real. This doctrine is derived from Leibniz, has been recently taken up by Strong, by Russell (in his later works), by Eddington, and by others. Ruyer defends a solution which he regards as approximating this theory, and finds much in common with *Gestalttheorie.*

PAUL REYNOLDS

WESLEYAN UNIVERSITY
MIDDLETOWN, CONNECTICUT

The Substance Theory of Mind and Contemporary Functionalism. A Dissertation. By THOMAS J. RAGUSA. Washington, The Catholic University of America, 1937. Pp. viii, 102.

This dissertation is a critical estimate of the theory of mind in the philosophy of Thomas Aquinas in relation to the theories of mind in Aristotle and in the functionalism of John Dewey. The exposition of Aquinas' view asserting the substantial unity of soul and body in the human organism is particularly clear. The book is a useful reminder of this view as an alternative to some of the curious theories proposed by philosophers since Descartes.

J. R. CRESSWELL

WEST VIRGINIA UNIVERSITY

Religion and Contemporary Psychology. Liddell Memorial Lectures at the University of Durham, Ninth Series. By J. H. PEAR. New York, Oxford University Press, 1937. Pp. 52.

The title is misleading. For Mr. Pear, professor of psychology at the University of Manchester, has little to say directly about religion or the psychology of religion in the three lectures in the volume. In "The Sense of Reality" psychologists are charged with failure to discriminate between the supra-rational and the sub-rational (illusion), because scientific method is applicable to neither. The thesis of "Conscience and Moral Behavior" is that conscience, far from being merely a social deposit on the unconscious self, manifests a "creative quality in choosing the highest standards we know". The last lecture, "Personal Relationships", outlines a pro-

gram of research for social psychology and discusses the psychology of "class-feeling" as an example.

STREET FULTON

McGILL UNIVERSITY

Selections from Bacon, Hobbes, Locke. The Doubleday-Doran Series in Philosophy. Edited by GAIL KENNEDY. Garden City, Doubleday, Doran & Company, Inc., 1937. Pp. xliv, 394.

This volume contains extracts from Francis Bacon's *The Great Instauration,* from Thomas Hobbes' *Leviathan,* and from the second and fourth books of John Locke's *Essay.* The original headings and divisions of the several works have been retained, and notes inserted "indicating or summarizing the omitted material" by means of quotation rather than paraphrase, when this was feasible. Professor Kennedy has supplied an interesting introduction which indicates briefly the political, social, and intellectual *milieu* of each author. There is a prudently selected bibliography.

STREET FULTON

McGILL UNIVERSITY

La destinée et le problème du vrai: l'esprit et le réel dans les limites du nombre et de la grandeur. Par FRANCIS MAUGÉ. Paris, Félix Alcan, 1937. Pp. 368.

"Twenty-seven years of silent meditation" separate two earlier works from this. The author's great problem is now to discover the nature of Spirit through the law relating it with Reality in mathematics and the natural sciences. Such a study he believes indispensable for an adequate grasp of values. He seeks throughout to reconcile two tendencies: the rationalism of such thinkers as Meyerson and Brunschvicg, and vitalism such as that of Bergson and Le Roy. The present volume is devoted to number and magnitude, which reveal most simply and clearly the characteristic relation of Spirit and Reality, Spirit acting creatively upon the real, yet submitting to its inexorable demands.

STEPHEN A. EMERY

UNIVERSITY OF NORTH CAROLINA

Unendliche Sphäre und Allmittelpunkt. Beiträge zur Genealogie der mathematischen Mystik. Von DIETRICH MAHNKE. Halle (Saale), Max Niemeyer, 1937. Pp. viii, 252.

Professor Mahnke's work, the result of an investigation undertaken for the purpose of supplementing the research of French scholars on the antecedents of Pascal's "Sphère infinie", traces the history of the sphere as a symbol, from the form which this symbolism assumed in German Romanticism back to the germ of the idea in the Orphic Hymns. The author examines the numerous variations in the figure and the concepts actuating these modifications, with a view to determining the significance of the symbol in the progress of thought. The most extensive and detailed consideration is given to Nicolas of Cusa and Bruno, who, according to

Professor Mahnke's findings, were responsible for secularizing the symbol, employing the infinite sphere with an ubiquitous center to represent the limitless physical universe which was suggested to them by the mystic-religious concept of an infinite and omnipresent God.

JOHN S. TREMPER

CORNELL UNIVERSITY

Dictionnaire de spiritualité. Fascicule VI. Paris, Gabrielle Beauchesne et ses fils, 1937. Pp. 601-2002.

The sixth volume of this very significant Dictionary of Asceticism and Mysticism covers items from *Bibliothèques* to *Byzance*. The two most important articles for readers of the *Philosophical Review* are perhaps those on Jacob Boehme, and on Saint Bonaventura. The latter occupies columns 1768-1843 and is written by E. Longpré, O.F.M. It is followed by an interesting and valuable article of thirteen columns on *Apocryphal* books attributed to Bonaventura, the most interesting of which is *Stimulus amoris*, which was actually written by Brother James of Milan at the end of the thirteenth century.

RUFUS M. JONES

HAVERFORD COLLEGE

Great Thinkers. The Quest of Life for Its Meaning. By TRUMBULL G. DUVALL. New York, Oxford University Press, 1937. Pp. xx, 320.

This series of gracefully and thoughtfully philosophical pen-portraits of Buddha, Confucius, Socrates, Plato, Aristotle, Epicurus, Stoics, Plotinus, Jesus, St. Augustine, Spinoza, Kant and his school, Schopenhauer and Nietzsche, stresses the inspirational rather than the systematic elements of their philosophies. While this is a valuable emphasis for the teaching of the introduction to philosophy, the reviewer is convinced that G. T. W. Patrick's text amply proves that both the inspirational and the systematic features of philosophies can be effectively combined.

HERMAN HAUSHEER

LAMONI, IOWA

Art Reconstructed. A New Theory of Aesthetics. By THEODORE L. SHAW. Boston, Marshall Jones Company, 1937. Pp. x, 276.

"The purpose of this book is to initiate revolt against the . . . dogma [that Art is the expression of the finer part of ourselves], to eject from our minds all the preposterous blarney and false glamour that have gathered about Art, to reveal Art as that which it actually is, . . . simply a phenomenon of life, in the same way that Gravity or Space or Time are phenomena of life" (2). "Art is Rareness . . . there is nothing outside of Rareness which is necessary or even helpful to Art . . . Rareness is not only the essence of Art, but also its measure . . . Art coincides with Rareness at every point" (5-6). Rareness is analysed quantitatively in terms of "Neurostisms", Likeness, Tempo, Simplicity, Mixture, etc., with the aid of sixty-four pseudo-scientific figures and numerous tables. "Rareness Art" is then contrasted with "Intuitive Art" [*i.e.*, the Fine Arts] and defended as possessing "Factual [not Moral] Importance . . . because it puts

man's nervous system into balance" (241). Rareness as here defined is, of course, a factor in aesthetic response, and deserves investigation. But the reduction of art to rareness, and its mechanical analysis, reveals a complete lack of cultural orientation and artistic sensitivity. The publisher's extravagant claims for the book (see the jacket) are fantastic—an unusually flagrant instance of irresponsibility in advertising.

THEODORE M. GREENE

PRINCETON UNIVERSITY

Logic Theoretical and Applied. By D. LUTHER EVANS and WALTER S. GAMERTSFELDER. Garden City, Doubleday, Doran, & Company, Inc., 1937. Pp. xiv, 482.

This book contains both less and more than is found in most current texts. On the one hand no attempt is made to develop the symbolism employed by technical experts in mathematical logic. On the other hand the authors have placed the traditional topics in their wider philosophic context. Thus the book includes an account of psychological and epistemological problems, and in addition a brief treatment of the question of value. One gains the impression, indeed, that this final section constitutes the end for the sake of which the more specifically logical discussions have been undertaken.

RAY H. DOTTERER

THE PENNSYLVANIA STATE COLLEGE

Social Ethics. An Introduction to moral problems. By EPHRAIM EDWARD ERICKSEN. Garden City, Doubleday, Doran & Company, Inc., 1937. Pp. xvi, 352.

Ericksen has succeeded in writing a simple text for beginners in the field. Short chapters furnish so many drawers of a neat filing system in which are arranged quotations from inspired writers, the bigger ideas, and the old-fashioned list of questions, together with topics for discussions and papers, A religious flavor pervades the whole and there is no danger that the book will lead the student astray toward any social radicalism. Let it be said that while the writing is simple the ideas reveal full stature and discipline.

VERGILIUS FERM

THE COLLEGE OF WOOSTER

Das Problem der reinen Anschauung. Eine erkenntnistheoretische Untersuchung der Prinzipien der Mathematik. Von WOLFGANG CRAMER. Heidelberger Abhandlungen zur Philosophie und ihrer Geschichte, 27. Tübingen, J. C. B. Mohr (Paul Siebeck), 1937. Pp. vi, 90.

This little volume attempts an epistemological investigation of the principles of mathematics. It aims to clarify the concept of pure intuition, to which the analysis of the basic concepts of mathematics is held to lead. Objectivity is construed as a contribution of knowledge, and the thesis is defended that mathematical knowledge generates its object. Inasmuch as knowledge occurs as a temporal process, time is the principle conditioning objectivity. Pure intuition, which is regarded as an act or as subjectivity,

is thus a central and universal principle of knowledge. The concept of infinity is derived from the principle of pure intuition. Of particular interest is the critical discussion of finitism and the author's attempt to apply his analysis of the transfinite to the antinomies of the theory of classes. It is unfortunate that a work bearing evidence of considerable thinking and clarity of expression should be burdened with the fallacy that, both for mathematics and for physics, objectivity is established through subjectivity as a principle, or through pure intuition.

MARVIN FARBER

UNIVERSITY OF BUFFALO

L'ideologia Rosminiana nei rapporti con la gnoseologia Agostiniano-Tomistica. Per GRAZIOSO CERIANI. Pubblicazioni della Università Cattolica del Sacro Cuore, Serie Prima: Scienze filosofiche, Volume XXVIII. Milano, Società Editrice "Vita e Pensiero", 1937. Pp. xii, 388.

This able and profound addition to the literature on Rosmini is a warning to the faithful in the face of the recent *Edizione Nazionale* of his works. It argues that Rosmini is a deviator from Neo-Thomism and not its originator. It is granted that he conserves the *anima di verità* of philosophy and recognizes, in common with both idealist and Neo-Thomist (strange company!), that the true method of philosophy has its beginning in epistemology. His *"idea madre"* is that "the *a priori* character of all reality is given by the transcendental nature of the *a priori* synthesis or foundation of knowledge". But Rosmini is too much an idealist. His is a metaphysics of phenomena, not of Being, and hence violates what the author values as "la filosofia: philosophia perennia". It is difficult for an outsider to understand the need of devoting an entire book to so manifest a thesis.

ROGER W. HOLMES

SOUTH HADLEY, MASSACHUSETTS

Materialism in Politics. By J. L. STOCKS. L. T. Hobhouse Memorial Trust Lectures No. 7, delivered at King's College, London. London, Oxford University Press, 1937. Pp. 28.

This lecture was delivered, as the Preface states, a few weeks before the author's death and was probably the last work undertaken by him. It is an argument for the traditional English theory of representation, against the more extreme forms of so-called democracy which have a preference for direct popular government, and equally against the Marxian theory of economic causation in politics. Both these theories are regarded as variants of materialism, *viz.*, the belittling of responsibility.

GEORGE H. SABINE

CORNELL UNIVERSITY

Le Maeterlinckianisme. Par MAURICE LECAT. Bruxelles, Anc^{ne} Librairie Castaigne, 1937. Pp. 218.

This is the first volume of a comprehensive study which seems to be intended wholly to discredit Maeterlinck's thought. It contains but little of interest to students of philosophy, even in the discussion of "Le trésor

des humbles" and "La sagesse et la destinée". M. Lecat's attitude is always unsympathetic and too often openly scornful, as when he attempts to ridicule Maeterlinck's mysticism. Maeterlinck's debt to such writers as Emerson and Carlyle, Ruysbroeck and Marcus Aurelius, is emphasized at the expense of his originality. M. Lecat insists that Maeterlinck has, in the case of Emerson, plagiarized "scandalously" (48)—this despite the fact that Maeterlinck acknowledges Emerson at least as emphatically as, for instance, Emerson himself acknowledged his own dependence upon Plotinus, who is, after all, the teacher of them both.

NEWTON P. STALLKNECHT

BOWDOIN COLLEGE

The Aesthetic Situation. The Harvard Phi Beta Kappa Prize Essay for 1937. By ARTHUR SZATHMARY. Cambridge, Harvard University Press, 1937. Pp. xiii, 74.

It is the author's belief that, though Bergson has written no work on aesthetics, his emphasis on the aesthetic aspect of experience is his chief contribution to philosophy. The first part of this essay carefully traces the doctrine of intuition through *Matière et mémoire, L'évolution créatrice,* and *L'introduction à la métaphysique* (all passages cited being in the author's own translation). The second part continues with an exposition of Bergson's theory of art. His indebtedness to Félix Ravaisson is established. The main works from which materials are drawn are the *Essai, Le rire,* and *La Perception du changement.* The author concludes that, according to Bergson, all philosophic enquiry must proceed from aesthetic intuition.

E. T. MITCHELL

THE UNIVERSITY OF TEXAS

Leçons sur la philosophie de l'histoire. Par G. W. F. HEGEL. Traduction par J. GIBELIN. Vol. I. Paris, J. Vrin, 1937. Pp. iv, 228.

This is an admirable translation of Hegel's philosophy of history, covering the Introduction and the First Part dealing with the Oriental World. The translator has chosen Glockner's text (which follows the original edition of Gans) rather than the much improved text of Lasson, on the strange ground that those who in Germany and France came under the influence of Hegel's philosophy had at their disposal none but the early editions of his works.

J. LOWENBERG

UNIVERSITY OF CALIFORNIA

Arthur Schopenhauer zum 150. Geburtstag. Eine Einleitung in seine Philosophie. Von GUSTAV MICHAELIS. Leipzig, O. R. Reisland, 1937. Pp. viii, 190.

This is a volume of selections from Schopenhauer's works, reflecting the editor's estimate of his public's taste in philosophical readings. An introductory chapter on Schopenhauer, reprinted from Eugen Dühring's *Kritische Geschichte der Philosophie,* is followed by Supplementary Chapters xvii and xliv of *The World as Will and Idea:* "Über das metaphysische Bedürfnis des Menschen" and "Metaphysik der Geschlechtsliebe", and by

the chapter "Über die Universitäts-Philosophie", from the *Parerga und Paralipomena*. As a concluding offering, the editor has provided an anthology of passages from Schopenhauer's works expressing his opinions about the Jews. This publication, perhaps unwittingly, illustrates Schopenhauer's view of will-driven intelligence as a tool of the desires and passions of men.

RADOSLAV A. TSANOFF

THE RICE INSTITUTE

La philosophie chrétienne jusqu'à Descartes. III. Les systématisations scolastique de la philosophie chrétienne. Par B. ROMEYER. Paris, Bloud & Gay, 1937. Pp. 192.

This extremely condensed survey of medieval philosophy is divided into three chapters, entitled respectively "L'augustinisme philosophique", "L'aréopagitisme et l'aristotélisme", and "Bonaventurisme, thomisme et scotisme". This arrangement enables the author to introduce a considerable degree of continuity into the succession of medieval philosophies. The first two chapters examine the principal sources of the three great scholastic systematizations of Christian philosophy. These systems are considered in the last and longest chapter. The clarity obtained by such an arrangement is partially impaired by the extreme brevity and consequent unintelligibility of some passages. This is particularly noticeable in the discussion of Duns Scotus.

J. R. CRESSWELL

WEST VIRGINIA UNIVERSITY

The Relation of Hegelian Epistemology to the Development of Individuality. A Thesis presented to the University of North Carolina. By CONVERE JONES BURWELL. Studies in Philosophy No. 12. Chapel Hill, 1937. Pp. 160.

According to the author, epistemology is justified in the system of Hegel because the development of concrete individuality is dependent upon individual acquisition of knowledge. The development of this individuality is a necessity for the complete manifestation of the Absolute. It is impossible without the acquisition of knowledge through epistemology, the investigation of the relation of the mind to objectivity. Through this the Absolute as concrete individuality is expressed. The development of the mind as it acquires knowledge is the following of the determinations of mind by reason. The value of the exposition would be greatly enhanced by a paraphrasing of Hegel's terminology to show its meaning in present-day vocabulary.

ALBERT E. AVEY

THE OHIO STATE UNIVERSITY

L'opuscule de Siger de Brabant, "De aeternitate mundi." Par W. J. DWYER. Louvain, Institut Supérieur de Philosophie, 1937. Pp. 48.

In the introduction to this publication, the editor examines the manuscript tradition of the text in order to justify his edition. The justification seems to be entirely successful and this edition should supplant previous

ones. The text itself is a carefully reasoned discussion by the well-known proponent of Averroism in the thirteenth century. Siger does not discuss the eternity of the world directly, but considers a specific implication of the question. He shows first that it is impossible for the human species, into which all individuals are born, to have had a first generator; individual may generate individual endlessly. This consideration of the eternity of the human species involves next the problem of determining the status of any species or universal. He shows finally that if species did have a beginning in time, then potency would precede act. But Siger claims that the use of the terms potentiality and act really imply an endless series of generation and decay and, therefore, the eternity of the world.

J. R. Cresswell

West Virginia University

The Nature and Meaning of Evil and Suffering as Seen from the Evolutionary Standpoint. By C. J. Bond. London, H. K. Lewis & Co., Ltd., 1937. Pp. 30.

From Heisenberg's principle of indeterminacy the inference is drawn that, given increasing complexity of environment and sufficient time, every possible event will happen, evil as well as good. Evolution at certain stages has proceeded along experimental lines. The occurrence of evil is determined by failure on the part of organisms to respond adequately to changes in their environment. The maintenance of one individual organism involves the destruction of others in order to gain energy needed. Hence good and evil are relative, representing two aspects of the same event. Evil and suffering will probably decrease as adaptation becomes more perfect. Why the Creative Thought did not select some other universe is an unanswerable question. We believe in spite of inability to prove, that there must be some purpose behind creation.

Albert E. Avey

The Ohio State University

Acta Secundi Congressus Thomistici Internationalis, Invitante Academia R. S. Thomae Aquinatis, Romae, 1936. Acta Pont. Academiae R. S. Thomae Aq. et Religionis Catholicae, N.S. III. Turin, Casa Editrice Marietti, 1937. Pp. 586.

The Second International Thomistic Congress held in Rome in 1936 discussed three general problems: (1) Human Knowledge, (2) Philosophy and Science, (3) Philosophy and Religion. The present volume contains the official report of these discussions. Léon Noël and Francesco Olgiati presented papers on the first problem; Peter Hoenen, Casimir Kowalski, Agostino Gemelli, and Jacques Maritain contributed communications on the second problem; and Reginald Garrigou-Lagrange led the discussion of the third problem. A number of other communications also—one group especially dealing with the philosophy of Descartes—are published in this volume of the Proceedings.

Gerald B. Phelan

The Institute of Medieval Studies
Toronto

Le problème de la vie. Par W. RIVIER. Paris, J. Vrin, 1937. Pp. iv, 116.

The author of this little volume casts his philosophical reflections in the form of three dialogues between Hylas and Philonous, who resume their discussions after a lapse of two centuries. The issues raised by them are similar to those which form the contents of Berkeley's dialogues. But Philonous is a disciple of Bergson, and Hylas draws his inspiration from modern science. The author defends a "spiritual" view of reality on the basis of the "immediate data of consciousness." The defense is weak and unconvincing. In his brief introduction, however, the author states with admirable clarity the distinction between scientific and philosophic questions.

J. LOWENBERG

UNIVERSITY OF CALIFORNIA

Integrative Levels: A Revaluation of the Idea of Progress. By JOSEPH NEEDHAM. The Herbert Spencer Lecture of 1937. New York, The Oxford University Press, 1937. Pp. 60.

The subject is taken as one in which Spencer would be much interested were he alive today. It concerns the existence of levels of organization in the universe, successive forms of order in a scale of complexity and organization. Change in organizational level means that what were wholes on a lower level become parts on a new, *e.g.*, protein crystals in cells, cells in metazoan organizations, and metazoan organisms in social units. Organization has not reached its highest level. We can see the next stages in the cooperative commonwealth of humanity, the socialization of the means of production.

ALBERT E. AVEY

THE OHIO STATE UNIVERSITY

Morale théorique et science des mœurs. Par GEORGES GURVITCH. Paris, Félix Alcan, 1937. Pp. vi, 200.

This book is concerned with a detailed analysis of the perennial question regarding the nature of ethics. The author defends the distinction between a science of morals and a philosophy of morals. A science of morals, dealing with "external facts", depends upon the descriptive method common to all the sciences; a philosophy of morals, having for its content "immediate data", can be justified only if there is an intuitive method for discovering these data. The author maintains that there is such a method, and he argues for its validity. The result is a synthesis of two different but interdependent views of morals. A sociology of morals (such as Lévy-Bruhl's) is thus shown to have its basis in moral experience accessible to philosophy alone. And by philosophy the author understands that discipline (such as Bergson's) which has for its objects the immediate data of consciousness.

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The following books have been received:

Thomas Garrigue Masaryk: The Ideals of Humanity, translated by W. Preston Warren, and *How to Work,* translated by Marie J. Kohnholocek and translation revised by H. E. Kennedy. Lectures delivered in 1898 at The University of Prague. London, George Allen & Unwin, Ltd., 1938. Pp. 192.

Studies in Humanism. By J. W. Mackail. London, Longmans, Green & Co., 1938. Pp x, 271.

James Madison, Philosopher of the Constitution. By Edward McNall Burns. New Brunswick, Rutgers University Press, 1938. Pp. xii, 212.

Shakespeare's Philosophical Patterns. By Clyde Walter Curry. Baton Rouge, Louisiana State University Press, 1937. Pp. xii, 244.

Bayle's Relations with England and the English. By Leo Pierre Courtines. New York, Columbia University Press, 1938. Pp xii, 254.

Foundations of the Unity of Science. Vol. I, No. 1: *Encyclopedia and Unified Science.* By Otto Neurath, Niels Bohr, John Dewey, Bertrand Russell, Rudolf Carnap, Charles W. Morris. No. 2: *Foundations of the Theory of Signs.* By Charles W. Morris. (International Encyclopedia of Unified Science, Vols. I and II.) Chicago, The University of Chicago Press, 1938. Pp. viii, 76; viii, 60.

Are We Movie-Made? By Raymond Moley. New York, Macy-Masius, 1938. Pp viii, 9-64.

History of Zoroastrianism. By Maneckji Nusservanji Dhalla. New York, Oxford University Press, 1938. Pp xxxiv, 526.

A Personalist Manifesto. By Emmanuel Mounier. Translated from the French by Monks of St. John's Abbey. New York, Longmans, Green and Co., 1938. Pp. xxii, 298.

Observation and Protocol Statement. By Bent Schultzer. Copenhagen, Levin & Munksgaard, 1938. Pp. x, 152. (London, Williams & Norgate, Ltd.)

Temps, espace, devenir, moi: les sosies du néant. Par A. Consentino. Traduit de l'italien par G. Frelat. Paris, Félix Alcan, 1938. Pp. iv, 206.

Les états du texte de Plotin. Par Paul Henry. Museum Lessianum, section philosophique, No. 20. Études Plotiniennes, I. Bruxelles, l'edition universelle, 1937. Pp. xxx, 428. (Paris, Desclée de Brouwer et Cie.)

L'évolution pédagogique en France. Des origines a la renaissance. Par Émile Durkheim. Avec une introduction par Maurice Halbwachs. Paris, Félix Alcan, 1938. Pp. vi, 222.

Le progrès scientifique. Par James Jeans, William Bragg, E. V. Appleton, E. Mellanby, J. B. S. Haldane, Julian Huxley. Traduction de l'Anglais par M. Paul Coderc. Paris, Félix Alcan, 1938. Pp. 200.

La psychologie expérimentale en Italie. École de Milan. Par A. Manoil. Paris, Félix Alcan, 1938. Pp. viii, 292, XVI.

Das Verhältnis von Rationalität und Irrationalität in der Philosophie Platons. Von Constantin Sandulescu-Godeni. Berlin, Junker und Dünnhaupt, 1938. Pp. 338.

Die Einsamkeit. Zimmermann und Obereit in Kampf um die Überwindung

der Aufklärung. Von WERNER MILCH. Frauenfeld/Leipzig, Von Huber & Co., 1937. Pp. 268.

Dasein und Wirklichkeit. Eine Einführung in die Seinslehre. München, Ernst Reinhardt, 1938. Pp. x, 352.

Sulla sofistica. Per ADOLFO LEVI. Estratto da *Sophia,* anno V, N. 3, 1937. Napoli, Casa Editrice Rondinella Alfredo, 1937. Pp. 191-211.

Il valore dei problemi della filosofia. Per ADOLFO LEVI. Estratto da "Conferenze filosofiche" tenute nella R. Università di Pavia nell' anno 1938. Pavia, 1938. Pp. 22.

La discorsività dell'essere. Per ALDO TESTA. Firenze, G. C. Sansoni, 1938. Pp. 142.

Il problema delle fonti del diritto positivo. Seconda edizione riveduta. Per GIORGIO DEL VECCHIO. Roma, Revista internazionale di filosofia del diritto, 1938. Pp. 22.

Riforma del codice civile e principi generali di diritto. Seconda edizione. Per GIORGIO DEL VECCHIO. Roma, Rivista internazionale di filosofia del diritto. Pp. 10.

Sulla involuzione nel diritto. Per GIORGIO DEL VECCHIO. Roma, Rivista Internazionale di filosofia del diritto, 1938. Pp. 26.

Giandomenico Romagnosi nel primo centenario della sua morte. Terza edizione. Per GIORGIO DEL VECCHIO. Roma, Rivista internazionale di filosofia del diritto, 1938. Pp. 24.

Il pensiero tedesco. Saggio di psicologia della filosofia tedesca. Per MARIO PENSA. Bologna, Nicola Zanichelli, 1938. Pp. ii, 320.

La filosofia dei greci nel suo sviluppo storico. Parte I. *I Presocratici.* E. ZELLER-R. MONDOLFO. Testo della V[a] edizione tedesca con nuovi aggiornamenti. Vol. II. *Ionici e pitagorici.* Firenze, La Nuova Italia, 1938. Pp. iv, 720.

Acta pont, academiae Romanae S. Thomae Aq. et religionis catholicae, N.S., Vol. IV, annis 1936-1937. Taurini-Romae, Ex officina libraria Marietti, 1938. Pp. 184.

NOTES

Samuel Alexander died at Manchester, England, on September 13, in his seventy-ninth year. At the time of his death he was honorary professor of philosophy at Manchester University, with which institution he was connected as professor of philosophy from 1893 to 1934. He was an honorary fellow of Lincoln and Balliol Colleges, Oxford, Herbert Spencer Lecturer at Oxford, 1917, and Gifford Lecturer at Glasgow, 1916-1918. Among his more extended writings are: *Moral Order and Progress,* 1889, and *Space, Time and Diety* (Gifford Lectures), 1920.

Professor E. B. McGilvary, of the University of Wisconsin, will deliver the next series of Carus Lectures before the American Philosophical Association. The lectures will be given at a joint session of the three Divisions of the Association, to be held at Columbia University in December, 1939. The title of the lectures, provisionally stated, will be "Surmises toward a Philosophical System".

THE following is a list of articles in current philosophical periodicals:

MIND XLVII 187: *H. Barker,* Notes on the Second Part of Spinoza's *Ethics* (II); *H. J. de Vleeschauwer,* Les Antinomies Kantiennes et la *Clavis Universalis* D'Arthur Collier; *F. M. Cornford,* The "Polytheism" of Plato: An Apology; *Charles Leslie Stevenson,* Persuasive Definitions; *H. D. Lewis,* Naïve Realism and a Passage in the Theaetetus; *M. Lazerowitz,* The Null Class of Premises.

PHILOSOPHY XIII 51: *J. D. Mabbott,* The Concepts of Politics; *John Bourke,* Responsibility, Freedom and Determinism; *J. L. Stocks,* Will and Action in Ethics (I); *H. B. Acton,* The Alleged Fascism of Plato; *Norman Campbell,* Laws and Theories; *Jared S. Moore,* The Relations of Philosophy.

THE JOURNAL OF PHILOSOPHY XXXV 14: *Theodore M. Greene,* Beauty and the Cognitive Significance of Art; *M. Whitcomb Hess,* Objectivity in Moral Philosophy. 15: *Richard B. Brandt,* On the Possibility of Reference to Inferred Entities; Eliseo Vivas, The Use of Art. 16: *James Feibleman,* The meaning of Comedy; *Rupert C. Lodge,* Synthesis or Comparison?. 17: *J. R. Kantor,* The Rôle of Language in Logic and Science.

THE JOURNAL OF SYMBOLIC LOGIC III 2: *Józef Pepis,* Ein Verfahren der mathematischen Logik; *C. West Churchman,* On finite and infinite modal systems.

ETHICS XLVIII 4: *Dewitt H. Parker,* Value and Existence; *Joseph Warren Beach,* Mr. Krutch and Ideal Values in Literature; *Eliseo Vivas,* Dreiser, an Inconsistent Mechanist.

PHILOSOPHY OF SCIENCE V 3: *C. H. Prescott, Jr.,* The Scientific Method and Its Extension to Systems of Many Degrees of Freedom; *John Elof Boodin,* A Revolution in Metaphysics and in Science; *Wilbur M. Urban,* Symbolism in Science and Philosophy; *Eliseo Vivas,* Nature, Common Sense and Science; *Ray Lepley,* The Verifiability of Facts and Values; *Robert K. Merton,* Science and the Social Order; *T. Swann Harding,* Science at the Tower of Babel.

THE HIBBERT JOURNAL XXXVI 4: *Ernest Barker,* Natural Law in the Political World; *M. Alderton Pink,* Towards a New Liberalism; *C. F. Andrews,* What India Thinks About the League; *Alfred Loisy,* Was Jesus an Historical Person?; *M. D. Petre,* A Comment on M. Loisy's Articles; *C. J. W. Wright,* "Validity" in Recent Ecclesiastical Discussion; *R. A. Edwards,* Needless Schism: A Comment on the Bicentenary of Wesley's Conversion; *William Harmon Norton,* The Cosmic Process as a Voyage of Discovery; *W. G. Moore,* Kierkegaard and His Century; *Hugh Brown,* Religious Education: Suggestion for a Non-Sectarian Controlling Idea; *G. W. Butterworth,* Doctrine in the Church of England: A Clerical Comment on the Commission's Report; *Reginald F. Rynd,* A Biblical Anniversary.

THE NEW SCHOLASTICISM XII 3: *James Hugh Ryan,* Edward A. Pace: Commemorative Appreciation; *The Late Edward A. Pace,* The Purpose of Man; *Charles R. Baschab,* The Nature, Source and Object of Truth; *Stephen Axters,* Le Maître Cistercien Nicolas de Vaux-Cerney et son Quodlibet; *R. Scannell,* Being and Becoming; *Elio Gianturco,* The Scholastic Substructure of Vico's Thought.

ANGLICAN THEOLOGICAL REVIEW XX 3: *William Morrow Washington,* A Federal Plan of Church Unity; *P. M. Rhinelander,* Church Congress Syllabus No. 2: "The Content of and Authority for Christian Evangelism": Part IV. The Validity of the Constant Emphasis on Christian Evangelism in the Light of Contemporary Criticism; *Sherman Elbridge Johnson,* The Churches Feel Their Way; *Charles Marston Lee,* Varronian Koine.

THE HARVARD THEOLOGICAL REVIEW XXXI 3: *Wilfred Lawrence Knox,* Jewish Liturgical Exorcism; *Hans Lewy,* Aristotle and the Jewish Sage According to Clearchus of Soli; *Charles C. Torrey,* Armageddon.

SPECULUM XIII 3: *John J. Parry,* Geoffrey of Monmouth and the Paternity of Arthur; *J. Homer Herriott,* A Thirteenth-Century Manuscript of the *Primera Partida; Charles Holt Taylor,* An Assembly of French Towns in March, 1318; *Arpad Steiner,* The Identity of the Italian 'Count' in Andreas Capellanus' *De Amore; J. A. McGeachy, Jr.,* The *Glossarium Salomonis* and Its Relationship to the *Liber Glossarum; George L. Haskins,* Charter Witness Lists in the Reign of King John; *Theodore Silverstein,* On the Genesis of De Monarchia, II, v.

THE BRITISH JOURNAL OF PSYCHOLOGY XXIX 1: *C. Fox,* The Method of Testing Literary Appreciation; *R. C. Oldfield and O. L. Zangwill,* The Acquisition of Verbal Repetition Habits; *S. Biesheuvel,* The Measurements of the Threshold for Flicker and Its Value as a Perservation Test; *J. L. Elwell and G. C. Grindley,* The Effect of Knowledge of Results on Learning and Performance. I. A Co-ordinated Movement of the Two Hands; *P. Slater,* Speed of Work in Intelligence Tests; *W. Ledermann,* Note on Professor Godfrey H. Thomson's Article "The Influence of Univariate Selection on Factorial Analysis of Ability"; *W. P. Alexander,* Intelligence Concrete and Abstract: Note.

THE AMERICAN JOURNAL OF PSYCHOLOGY LI 3: *J. J. Gibson* and *L. E. Crooks,* A Theoretical Field-Analysis of Automobile-Driving; *R. Y. Walker,* A Qualitative Study of the Eye Movements of Good Readers; *B. R. Philip,* A Comparison of Color-Blind Tests; *H. Werner,* Binocular Depth Con-

trast and the Conditions of the Binocular Field; *E. R. Hilgard, R. K. Campbell,* and *W. N. Sears,* Conditioned Discrimination: The Effect of Knowledge of Stimulus-Relationships; *W. A. Hunt* and *J. Flannery,* Variability in the Affective Judgment; *N. M. Locke,* Some Factors in Size-Constancy; *R. E. P. Youtz* and *S. S. Stevens,* On the Pitch of Frequency-Modulated Tones; *A. B. Blankenship* and *J. F. Humes,* Effect of Praise and Reproof upon Memory Span Performance; *M. A. Tinker,* Effect of Stimulus-Texture upon Apparent Warmth and Affective Value of Colors; *P. R. Farnsworth,* The Pitch of a Combination of Tones; *L. K. Allen* and *K. M. Dallenbach,* The Effect of Light-Flashes During the Course of Dark Adaptation.

Psychological Review XLV 4: *Clark L. Hull,* The Goal-Gradient Hypothesis Applied to Some 'Field-Force' Problems in the Behavior of Young Children; *James J. Gibson* and *O. H. Mowrer,* Determinants of the Perceived Vertical and Horizontal; *G. L. Freeman,* The Postural Substrate; *Norman M. Locke,* Perception and Intelligence: Their Phylogenetic Relation.

Journal of Experimental Psychology XXIII 1: *H. N. Peters,* Experimental Studies of the Judgmental Theory of Feeling: I. Learning of Positive and Negative Reactions as a Determinant of Affective Judgments; *R. M. Collier,* The Crossed Effects upon Voluntary Movement of a Unilaterally Induced Fatigue; *G. L. Freeman,* Postural Accompaniments of the Voluntary Inhibition of Micturition; *A. L. Winsor* and *B. Korchin,* The Effect of Different Types of Stimulation upon the pH of Human Parotid Secretion; *T. C. Scott,* The One-Error Per Trial Method of Maze Learning: How Affected by Instructions; *H. L. Hollingworth,* Verbal Gestalt Experiments with Children; *J. L. Graham,* An Experiment in Generalizing: A Unicursal Problem (1); *R. C. Travis* and *H. C. Anderson,* The Effect of Electric Shock on Learning in Eye-Hand Coördination. 2: *I. L. Child* and *G. R. Wendt,* The Temporal Course of the Influence of Visual Stimulation upon the Auditory Threshold; *R. E. P. Youtz,* The Change with Time of a Thorndikian Response in the Rat; *R. C. Davis,* The Relation of Muscle Action Potentials to Difficulty and Frustration; *D. B. Lindsley,* Foci of Activity of the Alpha Rhythm in the Human Electro-Encephalogram; *C. I. Hovland,* Experimental Studies in Rote-Learning Theory. III. Distribution of Practice with Varying Speeds of Syllable Presentation; *A. H. Holway* and *L. M. Hurvich,* On the Psychophysics of Taste; *E. N. Barnhart,* The Structure of Simple Compositions: The Relation of Single Element to the Field.

Psychological Bulletin XXXV 7: *John P. Foley, Jr.,* Empirical Approaches to the Problem of Space Perception; *W. L. Valentine,* Report of a Survey Conducted by the Motion Picture Committee; *Edwin R. Henry,* A Survey of Courses in Psychology Offered by Undergraduate Colleges of Liberal Arts; *Karl J. Holzinger,* Reply to Special Review of 'Twins'.

The Maha-Bodhi XLVI 6: *T. L. Vaswani,* Unto Buddha; *A. C. Albers,* The Influence of Buddhism on the Literature of Japan; *Diwan Bahadur K. S. Chandrasekhara Aiyer,* Gautama Buddha, His Life and Teaching; *V. M. Kaikini,* Did Buddhism Cause India's Downfall?; *Sm. Roma Devi,* Birthday of the Lord Buddha.

REVUE DE MÉTAPHYSIQUE ET DE MORALE XLV 3: *L. de Broglie,* Physique ponctuelle et physique du champ; *J. Laporte,* La liberté selon Malebranche; *P. Mouy,* Malebranche et Newton; *E. Leroux,* Note concernant l'influence de Malebranche sur Berkeley; *R. E. Lacombe,* Les vices de la démocratie et leurs remèdes.

REVUE PHILOSOPHIQUE LXIII 7 et 8: *P. Masson-Oursel,* Pensée pure, ou pensée technique?; *B. Fondane,* Léon Chestov et la lutte contre les évidences; *W. Drabovitch,* La conscience et les mécanismes du cerveau; *F. Maugé,* Le temps vécu et le continu spatio-temporel.

REVUE D'HISTOIRE DE LA PHILOSOPHIE ET D'HISTOIRE GÉNÉRALE DE LA CIVILISATION N.S. 22: *P. de Vaissière,* Marguerite de Valois, princesse de la Renaissance; *Henri Gouhier,* Malebranche et le problème de la participation; *René Hubert,* Essai sur l'histoire des origines et des progrès de la sociologie en France (I^e^ partie); *Hélène d'Alsó,* Nouvelles précisions sur *La Sténie* de Balzac; Mélanges, Speusippe.

LES ETUDES PHILOSOPHIQUES XI 3-4: *Numero Special,* I Congrès National des Sociétés Françaises de Philosophie, Marseille, April, 1938, Texte des communications.

ARCHIVES DE PSYCHOLOGIE XXVI 104: *Adèle Kenyeres,* Comment une petite hongroise de sept ans apprend le français; *Ed. Claparède,* A propos d'un cas de perception syncrétique (Avec 4 fig.); *Ch. Baudoin,* La psychanalyse, méthode et doctrine (à propos du livre de R. Dalbiez; *Ed. Claparède,* XI^e^ Congrès international de Psychologie (Paris 1937).

ERKENNTNIS VII 2: *Karl Dürr,* Die Einheit der Wissenschaften; *Hans Winterstein,* Der mikrophysikalische Vitalismus; *Rose Rand,* Kotarbinski's Philosophie auf Grund seines Hauptwerkes: "Elemente der Erkenntnistheorie, der Logik und der Methodologie der Wissenschaften".

ZEITSCHRIFT FÜR SOZIALFORSCHUNG VII 1/2: *Max Horkheimer,* Montaigne und die Funktion der Skepsis; *Herbert Marcuse,* Zur Kritik des Hedonismus; *K. A. Wittfogel,* Die Theorie der orientalischen Gesellschaft; *K. A. Wittfogel,* Bericht über eine grössere Untersuchung der sozialökonomischen Struktur Chinas; *Maxime Leroy,* Le Saint-Simonisme de Sainte-Beuve; *Ernst Křenek,* Bemerkungen zur Rundfunkmusik; *Rudolf Schlesinger,* Neue sowjetrussische Literatur zur Sozialforschung; *Felix Weil,* Neuere Literatur zur deutschen Wehrwirtschaft.

THEOLOGISCH-PRAKTISCHE QUARTALSCHRIFT XCI 3: *Otto Cohausz,* Wirklichkeit und Verwirklichung des gottmenschlichen Reiches Jesu Christi; *Karl Fruhstorfer,* Isaias' Berufungsvision; *P. J. Endred,* Zur Philosophie des Gebetes; *Damian Klein,* Was ist Opfer?; *B. van Acken,* Apostolat zum Beistand der Sterbenden; *Anton Seitz,* Astrologie und praktische Bewahrung; *Josef Grosam,* Die soziale Gerechtigkeit im Sinne der Enzyklika Quadragesimo anno.

BLÄTTER FÜR DEUTSCHE PHILOSOPHIE XII 1: *Nicolai Hartmann,* Zeitlichkeit und Substantialität; *Max Caspar,* Keplers "Mysterium Cosmographicum"; *Bodo Sartorius von Waltershausen,* Die Publizistik Wilhelm Diltheys; *Arnold Gehlen,* Zur gegenwärtigen Amerikanischen Psychologie. Eine Untersuchung über; William McDougall, Aufbaukräfte der Seele; *Johannes Hennig,* Aus Niederländischen philosophischen Zeitschriften (November 1936 bis Dezember 1937).

SCHOLASTIK XIII 3: *Jos. de Vries*, Erkenntniskritik und Metaphysik; *Karl Prümm*, Göttliche Planung und menschliche Entwicklung nach Irenäus Adversus haereses. II. Der Entwicklungsgedanke im Heilsplan Gottes für die Gesamtmenschheit; *Artur Landraf*, Die Unsündbarkeit Christi in den frühesten Schulen der Scholastik; *J. B. Schuster*, Natürliches und übernaturliches Sittengesetz; *Franz Pelster*, Das Heimatland des Richard von Mediavilla.

DIE TATWELT XIV 2: *v. Cochenhausen*, Die geschichtsbildende Kraft der Lebensanschauungen grosser Soldaten: I. Clausewitz; *Bruno Bauch*, Das Vertrauen als ethisches Problem; *Louis Lavelle*, Grundsätzliches zum Descartes-Kongress; *Marie Luise Gräfin Strachwitz*, Der Idealismus von Giovanni Gentile; *Rudolf Eucken*, Philosophie und Persönlichkeit.

RIVISTA DI FILOSOFIA XXIX 3: *P. Martinetti*, Sul fondamento trascendente della vita morale; *A. Del Vecchio Veneziani*, Nel centenario di Gaetano Negri (1838-1902); *A. Del Vecchio Veneziani*, Il valore della individualità; *C. Ferrio*, Il sistema caratterologico di Klages e la sua importanza nella moderna psicologia; *N. B.*, La vita come ricerca; *A. Saloni-G. G.*, La formazione dell'uomo greco.

GIORNALE CRITICO DELLA FILOSOFIA ITALIANA VI 3: *P. Giuffrida*, Valore e significato del Menesseno (*Contin. e fine*); *P. O. Kristeller*, Volontà e amor divino in Marsilio Ficino; *B. Magnino*, Il problema religioso di Sören Kierkegaard; *G. Gentile*, La vita come ricerca: Al prof. U. Spirito.

ANNALI DELLA R. SCUOLA NORMALE SUPERIORE DI PISA VII 1: *Medea Norsa*, Un frammento di fisica aristotelica in un papiro fiorentino (*Con la tavola I*); *Guido Calogero*, L'authenticità dell' "Ipparco" platonico; *Antonio Viscardi*, Le canzoni di gesta, i temi tradizionali, le fonti letterarie e diplomatiche (*continuazione e fine*); *Walter Ferrari*, Il carme 51 di Catullo; *Alessandro Perosa*, Miscellanea umanistica; *Michele Lupo Gentile*, L'agitazione mazziniana in Toscana e un tentativo di moto insurrezionale a Pisa nel 1854.

SCIENTIA LXIII 5: *B. Jasinowski*, Science et Philosophie; *B. Fischer-Wasels*, Moderne Grundprobleme der Geschwulstforschung. I. Teil.; *P. Janet*, L'examen de conscience et les voix. I^{ère} Partie; *R. U. Sayce*, The Ecological Study of Culture; *G. Cufodontis*, Le piante velenose dell'Africa. 6: *E. Bortolotti*, Prodromi di metodo matematico nei problemi babilonesi; *M. L. Zimmer*, Las causas de los grandes períodos glaciales. Una nueva hipótesis; *B. Fischer-Wasels*, Moderne Grundprobleme der Geschwulstforschung. II. Teil; *P. Janet*, L'examen de conscience et les voix. II^{ème} Partie; *A. J. H. Goodwin*, Recent Advances in South African Prehistory. 7: *H. Mark*, Die Elastizität langkettiger Substanzen als statistischer Effekt; *G. Lambertini*, Aspetti costituzionali dei muscoli degli atleti; *B. Fischer-Wasels*, Moderne Grundprobleme der Geschwulstforschung. III. Teil.; *P. Schilder*, The Child and the Symbol; *P. Rode*, Considérations biologiques et biogéographiques sur les primates de l'Afrique. 8: *H. Staudinger*, Ueber hochpolymere Verbindungen; *C. Zollikofer*, De l'influence des hormones animales sur les plantes; *Ch. E. Spearman*, Measurement of Intelligence; *F. Virgilii*, Dalla Statistica universitaria alla Statistica matematica; *C. Vallaux*, Parcs nationaux et réserves naturelles.

GREGORIANUM XIX 2: *J. Madoz*, El Símbolo del VI Concilio de Toledo

(a. 638). En su centenario Xiii°; *Ch. Boyer,* Providence et liberté dans un texte de Saint Thomas; *J. M. Bover,* El pensamiento generador de la Teología de San Pablo; *J. de Guibert,* En quoi diffèrent réellement les diverses écoles catholiques de spiritualité?; *S. Gonzalez,* La identidad de operación en las obras exteriores y unidad de la naturaliza divina en la Teología trinitario de San Gregorio de Nisa.

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I. Intelligible Communication: Its Nature and Conditions ..... WILBUR M. URBAN

II. Recent Attacks on Causal Knowledge ..... J. W. A. HICKSON

III. The Rationalistic Element in Kant's Doctrine of Fact ..... ALDEN O. WEBER

IV. DISCUSSION

The Relativity Paradoxes: A Footnote to the Lovejoy-McGilvary Controversy ..... NATHANIEL H. STEVENS
Science and Social Guidance ..... D R SCOTT
John Wilkins—A Precursor of Locke ..... GRANT McCOLLEY

V. REVIEWS OF BOOKS

Raymond Klibansky and *H. J. Paton* (Ed.): Philosophy and History: by George H. Sabine—*Edgar A. Singer's* On the Contented Life: by Grace A. de Laguna—*Henri Gouhier's* La jeunesse d'Auguste Comte et la formation du positivisme: by Albert G. A. Balz—*Mortimer Taube's* Causation, Freedom, and Determinism: by Philip Paul Wiener—*Charles Hartshorne's* Beyond Humanism: by Roger W. Holmes—*William Curtis Swabey's* Being and Being Known: by A. Cornelius Benjamin—*Johann Gottlieb Fichte's* Nachgelassene Schriften; II: Schriften aus den Jahren 1790-1800, herausgegeben von *Hans Jacob*: by G. S. Brett—*Frank Chapman Sharp's* and *Philip G. Fox's* Business Ethics: by Harold A. Larrabee.

VI. DESCRIPTIVE NOTICES

VII. NOTES

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CONTENTS FOR NOVEMBER, 1938

Intelligible Communication: Its Nature and Conditions ..... WILBUR M. URBAN 565

Recent Attacks on Causal Knowledge ..... J. W. A. HICKSON 595

The Rationalistic Element in Kant's Doctrine of Fact ..... ALDEN O. WEBER 607

Discussion

The Relativity Paradoxes: A Footnote to the Lovejoy-McGilvary Controversy ..... NATHANIEL H. STEVENS 624

Science and Social Guidance ..... D R SCOTT 638

John Wilkins—A Precursor of Locke ..... GRANT MCCOLLEY 642

Reviews of Books 644

Raymond Klibansky and *H. J. Paton* (Ed.), Philosophy and History: by George H. Sabine—*Edgar A. Singer's* On the Contented Life: by Grace A. de Laguna—*Henri Gouhier's* La jeunesse d'Auguste Comte et la formation du positivisme: by Albert G. A. Balz—*Mortimer Taube's* Causation, Freedom, and Determinism: by Philip Paul Wiener—*Charles Hartshorne's* Beyond Humanism: by Roger W. Holmes—*William Curtis Swabey's* Being and Being Known: by A. Cornelius Benjamin—*Johann Gottlieb Fichte's* Nachgelassene Schriften; II: Schriften aus den Jahren 1790-1800, herausgegeben von Hans Jacob: by G. S. Brett—*Frank Chapman Sharp's* and *Philip G. Fox's* Business Ethics: by Harold A. Larrabee.

Descriptive Notices 659

Notes 671

Samuel Alexander. Carus Lectures. E. B. McGilvary. Current philosophical periodicals.

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